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- Monday, June 13, 1892. Resolutions of thanks for courtesies extended, 172, 173; Resolution in reference to new badge adopted, 177.
- September 7, 1892. Ballots canvassed and members elected; "Increasing Cost of Railway Tie Renewals," read and discussed; "Thin Floors for Bridges," read and discussed, 197.
- September 21, 1892. Deaths of SIDNEY DILLON, JOHN WHITELAW and JAMES B. FRANCIS, announced; "Strength and Weathering Qualities of Roofing Slates," read and discussed; "Test of Power Required to Drive Electric Street Cars and Total Efficiency of the Motor," and "Motive Power for Street Railways," read and discussed, 198.
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American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—January, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

JANUARY 6TH, 1892.—The Society met at 20 o'clock, Vice-President Fteley in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members: James Work Deen, Salida, Colo.; William Millburn Gordon, Albmarle, N. C.; Herbert Franklin Northrup, Traverse City, Mich. As Associate Members: Charles Allen Cockroft, Brooklyn, N. Y.; Howard Judson Cole, New York City; William Hasson Converse, Chattanooga, Tenn.; Alexander Potter (elected Junior, January 4, 1888), Rome, N. Y.; Friedrich Rosenberg (elected Junior, October 2, 1889), Pueblo, Colo.; Albert Smith, Washington, Pa.

The death of Samuel B. Reed, M. Am. Soc. C. E., on December 26th, 1891, and the death of James R. Wardlaw, M. Am. Soc. C. E., on December 29th, 1891, were announced by the Secretary.

Discussion on the paper by J. A. L. Waddell, M. Am. Soc. C. E., on "Some Disputed Points in Railway Bridge Design," was presented by Messrs. Hardy, G. H. Thomson, Seaman, Skinner and Devin.

A paper on the "Availability of the Cañons of the Colorado River of the West for Railway Purposes," was read by the Secretary and discussed by Messrs. A. F. Sears and O. F. Nichols.

THE ANNUAL MEETING, JANUARY 20TH, 1892.

The meeting was called to order at 11 o'clock by the President, Mr. O. Chanute. Past Presidents Francis, Greene, Worthen and Paine were present at the meeting.

The PRESIDENT.—I am very glad to meet again the members of the Society, although I regret that, from the temperature of the room, we are giving you a rather cold reception.

The first business in order is the appointment of tellers to canvass the ballot for officers. The polls will, as usual, close at 12 o'clock and those who have not yet voted have still an opportunity of doing so. The chair is prepared to receive suggestions from the meeting as to the names of tellers to be appointed.

If there are no suggestions, the Chair will appoint Messrs. S. B. Downes, O. Erlandsen and David S. Carll as tellers.

It is proposed this morning to slightly alter the usual order of business, in order to reach the report of the Board of Direction at about 12 o'clock. The first business in order, therefore, is the report of the Committee on Units of Measurement, Mr. Egleston, Chairman; is that report ready?

By written request of the Chairman the report was deferred until the afternoon.

The PRESIDENT.—Next in order is the report of the Committee on Standard Time, Mr. Fleming, Chairman.

The Secretary presented a letter received from one of the Committee, Mr. F. Brooks.

Mr. SANDFORD FLEMING, Chairman of Committee.—I should explain, sir, that I have not yet gotten the signatures of all the members of the Committee to this report, there is nothing in it that any one would object to and I took it for granted that it would be accepted as the report of the Committee; it will not be printed, at all events, without the consent of the rest of the Committee. (Mr. Fleming read the report, see page 53.)

The PRESIDENT.—Gentlemen, you have heard the clear and interesting statement made by the Chairman of the Committee, relating the work performed by that Committee and the results accomplished. The Society is, I think, to be congratulated upon having had the services of a committee which has labored so long, so faithfully, and has accomplished such results, not only in this country, but throughout the rest of the world. This is now in the hands of the Society to decide what course it will pursue and the Chair will be glad to entertain a motion.

Mr. M. COHEN.—I move that the report be accepted and the Committee continued. (Carried.)

Mr. FLEMING.—I should like to ask if it would be proper for any other member of the Committee to raise any point for discussion. Un-

fortunately I am the only member of the Committee present just now, and it would be well to have the views of all; some may desire to raise some point for discussion, in connection with the report. If it be quite competent, that could be done at a later stage of the meeting.

The PRESIDENT.—It can be done at a later stage, and an opportunity given for discussion.

Mr. FLEMING.—My object is to give my colleagues an opportunity to say what they wish to say.

The PRESIDENT.—The next upon the programme is the report of the Committee on "Impurities of Domestic Water Supply," Mr. A. Fteley, Chairman.

(Mr. A. Fteley read the report on page 61.)

Mr. FTELEY.—This short report was prepared because it has been found difficult for the three members of the Committee, who are wide apart, to meet at the last moment. We do not think, for the present, that it would be desirable to give to the Society in detail the work done by the Committee; it would simply make you follow us during the last year through a great many preliminary steps which are only of secondary interest. The Committee at first, in the beginning of the year, waited, as we said in our last report, to see the result obtained by the American Association of Water Works.

They tried to work in the same direction that we expect to, but in a different manner. In other words, they have spent a great deal of time, and they are entitled to a great deal of credit for it, in carrying on a very extensive correspondence with many State boards of health and many private water companies. I need not say that the labor was enormous. It was done by some members of the Committee, and they have obtained some exceedingly interesting partial results. I might read here what was said last year, in part, for the information of the present meeting, that the belief of your Committee is that no useful result will be obtained until the observations made by people who are in charge of water works can be concentrated into the hands of one body, who should make analyses of all waters, should exchange ideas with other bodies, and, from the experience of all, make reports that should embody these experiences and the various circumstances under which the investigations have been made. The troubles that have been found have been sometimes of a very serious character. I could give you the experience of one city not thirty miles from New York that is suffering from this effect to such an extent that it is almost impossible not only to drink the water, but even to bathe in it. In studying the literature on the subject it is often found that the results that have been obtained are very different when the causes are almost identical, and it is impossible to come to any useful conclusion unless all these data, these innumerable data, are collated by some intelligent person. The idea of your Committee is that this Society should simply agitate the question and try to bring

together the people who are most interested. Your Committee has thought it possible to interest a large number of public bodies, and if they can be induced to give even a small amount of money each, a committee of their own can be formed which shall select experts and establish a bureau of general information which shall report to all its constituents the result of their labors. We all know how difficult it is to bring these matters before the public. I think on that one point the result would be so important, if it could be attained, that it would justify your Committee in going on.

We have now in preparation a circular that we have submitted not only to persons in charge of important water works, but that we also submitted last year, informally, to some members of the National Association. We have met with some partial success, and this and other information make us confident that we may by next year prepare a report in which we will either ask you to discharge us because we have not been able to succeed, or we may, I hope, give you a report that will certainly be to the credit of the Society.

THE PRESIDENT.—The members have heard the report and the remarks of the Chairman of the Committee, and unless there be objection the Committee will be continued.

I would again state, as some additional members have come in, that the polls will be closed at 12 o'clock, and those who have not voted and desire to do so can hand in their votes.

The next business in order is the report of the Committee on Uniform Methods of Testing, of which Mr. Bouscaren is Chairman and will read the report. I am informed by the Secretary that that Committee is not quite ready to report yet, but will be before we adjourn, and that the report of the Committee on Standard Rail Sections, which is set down for this time, is in the same condition.

MR. THEODORE COOPER.—Mr. President, during the prevailing epidemic I think that we are taking a great deal of risk in holding the meeting in a room as cold as this is. I do not believe the business before the Convention is worth taking such a risk, and I therefore suggest that we adjourn for conversation and personal amusement until after lunch, in hopes that by that time this building may be warm enough to be habitable.

THE SECRETARY.—There is a Sunday-school room down-stairs which is warm.

Past President WILLIAM E. WORTHEN.—I move we adjourn down-stairs. (Carried.)

THE PRESIDENT.—The next business is the report of the Board of Censors to award the Norman Medal.

The Secretary read the report, as follows:

The Board of Censors appointed to award the Norman Medal for papers presented to the Society during the medal year terminating

August 1st, 1891, beg to report that they award the medal to John R. Freeman, Member of the Society, for paper No. 479, entitled "The Nozzle as an Accurate Water Meter."

Respectfully submitted,

JOHN T. FANNING,
W. B. COGSWELL,
GILBERT MURDOCH,
Board of Censors.

The next is the report of the Committee to award the Rowland Prize.

The Secretary read the report of the Committee, as follows:

The Committee appointed to award the Rowland Prize for papers published during the year ending August 1st, 1891, is of the opinion that it should be awarded to paper No. 446, "The River Spans of the Cincinnati and Covington Elevated Railway Transfer and Bridge Company," by Mr. William H. Burr.

Your Committee desires to express its commendation of paper No. 452, "On the Designing and Erection of the Oakley Arch," by Mr. J. Foster Crowell.

In making its award, your Committee has given preference to the consideration of papers describing accomplished works of construction.

Very respectfully,

G. B. NICHOLSON,
CHAS. E. L. B. DAVIS,
F. COLLINGWOOD.

The PRESIDENT.—The next business is the time and place of the Annual Convention.

The Secretary read a *résumé* of the replies, as follows:

Chicago, 26; Boston, 20; Saratoga, 13; San Francisco, 12; Washington, 10; Old Point Comfort, 10; New York, 9; Philadelphia, 9; St. Louis, 9; Ithaca, 6; Newport, 6; Detroit, 5; Denver, Col., 5; Pittsburg, 5; Niagara Falls, 4; Newport, 4; Buffalo, 4; Bar Harbor, 4; Richmond, Va., 3; Lake George, 3; Lake Superior, 3; White Sulphur Springs, 3; Chautauqua Lake, 2; Halifax, N. S., 2; Mexico City, 2; Duluth, Minn., 2; Atlanta, Ga., 2; Albany, N. Y., 2; Cleveland, O., 2; Baltimore, 2; Some point in the West, 2; Board to decide, 2; Hartford, 1; Cincinnati, 1; Catskills, 1; Tacoma, 1; Helena, Mont., 1; Deer Park, 1; Watch Hill, R. I., 1; Asheville, 1; White Mountains, 1; Portland, Ore., 1; Atlantic City, 1; Sea Bright, 1; Jersey Coast, 1; Burlington, Vt., 1; Mammoth Cave, 1; Alexandria Bay, 1; Toronto, 1; Mackinac Island, Mich., 1; West Point, 1; National Park, 1; Blue Mountain House, W. Md. R., 1; Paul Smith's, 1; Salt Lake City, 1; Central Southwest, 1; New England, 1; Some point in the N. E., 1; Some point in the Middle States, 1.

Mr. BOGART.—Mr. President, may I ask that the Secretary read the three or four which have a considerable number of votes each. (This was done.)

Mr. T. GUILFORD SMITH.—There are one or two localities mentioned by the Secretary that might be grouped, for instance, Saratoga and Lake George are practically the same places.

The SECRETARY.—A good many felt that it was desirable that the Society should go to some point in the north.

Mr. DESMOND FITZGERALD.—Would it not be desirable for the Convention to go to Chicago?

The PRESIDENT.—I think it would be desirable to hold the Convention there year after next.

Mr. BOGART.—That is ninety-four. Mr. FitzGerald asks whether it would not be desirable to hold the Convention next year in Chicago, and this year somewhere else.

The PRESIDENT.—I think so, and I will lay before the meeting a circular which is about to be issued by the joint engineering societies, which will make it clear that that will be the desirable thing to do.

Mr. FITZGERALD.—In that case, the indications point to Saratoga, and I propose to make the motion that Saratoga be chosen.

Mr. BOGART.—Mr. President, I would suggest that unless there has been some special inquiry made, which may have been done (Mr. FitzGerald may know about that), it would be well to express the preference of the Annual Meeting, but leave the determination to the Board of Direction, or to another meeting. There may be obstacles to holding the meeting at the point selected by the Annual Meeting. That was done once, and it was found exceedingly undesirable on account of the difficulty in making arrangements.

Mr. FITZGERALD.—I accept. I would move that it is the sense of this meeting that Saratoga is a desirable place for holding the next Convention. (Seconded.)

The CHAIR.—It is moved and seconded that Saratoga will be a suitable place for holding the next Convention.

Mr. M. M. TIDD.—I would like to inquire what the recommendations are for Saratoga. I never could see any.

Mr. FITZGERALD.—As a water man, I think Mr. Tidd ought not to ask that question.

Mr. JOHN BOGART.—It is a very good place the next morning.

Mr. J. J. R. CROES.—I think that is just the reason why Mr. Tidd did suggest it; he wants pure water. I think we ought to go out of New York State for the Convention, and I would suggest that Fortress Monroe would be a very desirable place. It is on the Atlantic coast, farther south than we have been in the habit of going, and is a charming spot.

A MEMBER.—Are there good hotels?

Mr. CROES.—The best in the country.

Mr. SMITH.—As I have mentioned Saratoga in my written communication to the Society, I will give my reasons. If I understand it correctly, we go to a place like Saratoga where there are no outside distractions, and we have an opportunity for professional discussions. There are lots of papers which are not read if you go to a large city, where there are many points of interest to be visited. Saratoga is only about

a couple of hours from Lake George, which several have mentioned; about the same from Burlington, which has been indicated by several; and if we choose to go to Saratoga and choose to have our Convention there, we can make arrangements with some one of the large hotels to take us all in, have the hotel to ourselves, and get special rates, etc., which I should think would not be possible at Fortress Monroe. Besides that, last year we went to Chattanooga, which was in the South. The naming of Saratoga is in harmony with those gentlemen who have named "some place in the north-east." If the Committee investigate and find that accommodations can be arranged for there, it is a very desirable place. If it is found that arrangements cannot be made, I am perfectly willing to refer it to the incoming Board.

Mr. TIDD.—Mr. Croes expresses my views exactly, in the water line. I want good water. There is plenty of water around Fortress Monroe; good water, and—they have some way of fixing it.

Mr. MENDES COHEN.—Mr. President, it occurs to me that Saratoga fills comparatively the directions of most of our Western and Southern members, those to whom it appears desirable that the Convention should be located in the City of New York, or near the headquarters of the Society. It would be desirable that we should get some unanimity for any location. I think there could be no objection to Fortress Monroe, provided that members desire to be at the seaside. It is true that at the end of June the weather is apt to be warm at Fortress Monroe, but there are plenty of breezes there, and it is very comfortable. The hotel accommodation at that season will be ample for a convention of twice the size of this. The hotel accommodation is as large as is to be found anywhere.

There is another point which has been mentioned—the Blue Mountain House. There is a hotel located on the western slopes of the Blue Ridge, commanding Cumberland Valley. If members desire a mountain resort, at an elevation of about 1 400 feet, I do not think a more desirable location could be found anywhere. The hotel will amply accommodate all who usually attend our Conventions. For my own part, if the location should be determined on for a mountain resort, I should advocate the Blue Mountain House. The elevation is not so great that you run any risk of the extreme cold which we have sometimes experienced among the mountains; but if it is to be at the seaside, I do not think we can do better than Old Point.

Mr. BOGART.—What are the railroad accommodations?

Mr. COHEN.—A rendezvous can be made at Baltimore; thence by the West Maryland road. Those coming from the West can do so by the Baltimore and Ohio road, or by the Norfolk and Western Railroad (Shenandoah Valley), probably without change of cars, coming up to the door of the hotel, or by the Pennsylvania Railroad System to Harrisburgh, and thence by the Reading System directly to the hotel; or

the trip from New York may be made by the Central Railroad of New Jersey and the Reading System, which lines will, no doubt, be willing to arrange for a through train.

MR. S. B. MCKEE.—The advantages for holding a Convention at Saratoga, for the north-eastern section of the country, are very well understood; besides that, there are some very pleasant trips to take—one to the iron beds of Fort Henry, and I have no doubt all the courtesies of the companies would be extended to the Society.

COLONEL WILLIAM P. CRAIGHILL.—MR. President, permit me to say a word. I am, perhaps, one of the few members who have had the opportunity of being at the Blue Mountain House, and know its capacity for comfort and its facility of access.

At Fortress Monroe, in addition to the large Hygeia Hotel there has been another large hotel put up within a few months and the two would be ample under any circumstances. In addition to that, being an officer of the army, perhaps I may say that I feel quite sure, although I can make no pledges on the subject, that so far as any additional accommodation for the meetings of the Society are concerned, the commanding officer has such rooms as would be adapted to such use, and I am quite sure that he would be perfectly ready to have them occupied by the Society, without cost. And, with reference to Fortress Monroe, it is a place easy of access, as we know, from this city by the Pennsylvania route, and also by the Chesapeake and Ohio, which is now a big trunk line from the West. At that season of the year those pestiferous insects are not present and it is not too early to enjoy the sea bathing. I suppose, like other societies, this Society is fond of good living, and at the entrance of Chesapeake Bay the waters abound in terrapin and crab; and there is good water, both salt and fresh, with all the condiments; the mint julep would be found in its perfection, and I must say I never can forget the mint julep.

MR. S. WHINERY.—The preference shown by members in this vote has been very slight and very few have expressed any preference at all. Besides, it is rather early in the season to attempt to fix a point for the Annual Convention. Circumstances may entirely change the aspect of affairs with reference to any one location, therefore I would move, to supersede Mr. FitzGerald's motion, this, that inasmuch as a very slight preference has been expressed by members as to the location of the Annual Convention, the whole subject be referred to the Board of Direction.

MR. TIDD.—I would suggest to the meeting that members first be given a chance to express their views, and that two or three of those more prominent places be mentioned. I have no objection to its going, later on, to the Board of Direction; this has been customary, although it has sometimes happened that the Convention has gone to a place that nobody had thought of.

The PRESIDENT.—The Chair understands the pending resolution merely to express a preference in favor of Saratoga; does the author accept the later motion?

MR. FITZGERALD.—I am afraid that Saratoga, after the eloquent reference to mint julep, has little chance.

It seems to me that it is extremely desirable that we should know more about the hotel accommodation. If we are obliged to go to a hotel which is crowded with other people and where we cannot be attended to properly, however delightful the salt water may be, or even the mint julep or the succulent oyster, the terrapin and crab, I should be in favor of going to Saratoga, where we can have a hotel entirely to ourselves. Personally I think it would be very much better if we should go to Bar Harbor, and I voted for Bar Harbor. It seems to be desirable that the Convention should be held in the Northeast somewhere and Bar Harbor is a combination of seashore and mountains in a marvelous way. The hotels there have been almost deserted for a number of years, because the gay life has gone into the cottages entirely, and we can find a very excellent hotel there with accommodations for all, with charming excursions, and certainly the scenery in the neighborhood is most beautiful. I have heard one or two members express the feeling that perhaps the hotels at Point Comfort would not be the best for our meeting.

MR. BOGART.—What State is Bar Harbor in?

A MEMBER.—The State of Maine and prohibition.

MR. CLEMENS HERSCHEL.—As information is desired in the matter of hotels, I would like to state that at Old Point Comfort the hotel accommodations, as far as I know, would be very comfortable, especially in the month of June. Our custom has been to go to a certain place before the season opens, in this case it would be to go after the season is almost finished. The true season at Old Point Comfort commences about the first of May and if we go there in June we should be sure of ample accommodation. I myself would say I would be in favor of Old Point Comfort.

MR. F. COLLINGWOOD.—I had occasion to compare the average temperatures at Newport News with the average at New York for some two years, and found the average at New York to be about 10 degrees the higher. The variations were less considerably at Newport News.

Colonel W. P. CRAIGHILL.—What is the average temperature of Bar Harbor about the last of June?

MR. FITZGERALD.—I have not studied the meteorological statistics of Bar Harbor, but I believe the temperature is all right at that time.

MR. CROES.—In case it is cold, is there any way of warming yourself up internally?

MR. BOGART.—A gentleman from the East tells me that you can depend upon the temperature being above zero in June.

Mr. R. L. HARRIS.—Nearly every one from the Northwest likes to go to the seashore in summer. I think one of the pleasantest places at which we have ever held a convention was Seabright. At Fortress Monroe I have always found comfort, and Newport News is near by with points of attraction to engineers all about, as well as of enjoyment for all.

Mr. FITZGERALD.—I withdraw my motion in favor of Saratoga unless I can find some man here with courage to back me up.

Mr. T. GUILFORD SMITH.—I will back you up. I have been at a great many conventions at Saratoga and have always found it a very comfortable place. Without wishing to appear too partial to Saratoga, I would say, in addition to the iron mines, there is the Lake George scenery and the excursions into the Adirondacks, to say nothing of Mt. Macgregor, etc.

Mr. BOGART.—What is really wanted at a convention—I have of course had a great deal of experience, some pleasant and some not, in the results of conventions—what is wanted at the conventions is, as has been said here a moment ago, first, ample, comfortable, first rate hotel accommodation. Wherever we have been and have found that the convention has not been altogether successful, especially when going to a place where the hotel accommodation is not entirely good, we have found that a good many of our members do not stay through the convention. The next point is, of course, accommodation for the meetings. That can generally be accomplished anywhere where there is a good hotel. I think that the excursions are not of such great moment. I think our conventions are getting to be more and more a gathering together of our members generally, a great many of them with their families, and they prefer to have pleasant accommodation in a pleasant place, in a good place for our meetings. I suppose that the Kaaterskill was one of the most successful conventions that the Society ever had, I think that everybody was pleased and satisfied there. We had a good hotel, we went before the regular visitors came, we had a good room for our meetings, and we did have one or two pleasant excursions, but they were not the essential features of the Convention.

I think that, so far as the hotel accommodations are concerned, both Saratoga and Fortress Monroe have them amply. I have been a great deal at both places. At Fortress Monroe there is a new hotel built, in addition to the very large Hygeia Hotel, and even before that hotel was built the Hygeia afforded ample accommodation. I remember at the time that we held our Convention at Deer Park, the Convention would have been placed at Fortress Monroe, it came very near going there, there was a delay in the transmission of a letter from the proprietor of the hotel at Fortress Monroe. The committee supposed that he had not taken notice of our communication, and the letter came after we had perfected our arrangements with the proprietor of the hotel at Deer Park. There-

fore I speak with knowledge as to the accommodation at Fortress Monroe when I say that it certainly can be made ample. The weather in May and June there is charming. I lived at Fortress Monroe for a number of years myself, and can say that it is a delightful place. And then you have Norfolk and the improvements at Newport News, the great docks there which our Secretary has had to do with building, and I really think you can have at Fortress Monroe and at Saratoga delightful conventions. The question seems to me to turn on, what part of the country it is desired to go to.

So far as Bar Harbor is concerned, I do not know so much about it, I do not know whether you could get a hotel opened before the season; and the season there is very short, July and August.

THE PRESIDENT.—Does the Chair understand Mr. FitzGerald to withdraw his motion, or does he desire to modify it to include more than one place?

MR. FITZGERALD.—I hear a great deal of enthusiasm as to Saratoga in my immediate neighborhood, and I think we had better take a vote on it.

COLONEL CRAIGHILL.—It does appear to me that, as this meeting has practically said that it favors the meeting of the Society in 1893, at Chicago, and I expect that will meet with the unanimous approval of the Society, at this time it would be expedient to go a little farther away from Chicago than Saratoga, and I am extremely in favor of Fortress Monroe.

MR. CROES.—I think that there is no question at all as to the general sentiment of the Society preferring a seaboard place to an inland place as disagreeable as Saratoga is. We were inland last year, and it would be very desirable to visit the seashore, and particularly so charming a place as Fortress Monroe.

MR. FITZGERALD.—If we don't go to Newport this year I hope that some time we shall go there. To those who have been there it is hardly necessary for me to say anything in its praise. That town unites almost all the advantages, the climate is delightful, there is a great deal to see and there are good hotel accommodations; I believe we have not a mountain there, that is the only thing lacking.

A MEMBER.—I voted for Boston. I would like to ask Mr. Bogart what are the objections to Boston. The Boston Convention was the first one I ever attended, and it struck me as being a very nice Convention.

MR. BOGART.—There is no objection to Boston, we never had a more charming Convention than at Boston, but there has been a feeling that it was not desirable to impose ourselves too often on the same people; it is a good while ago since we were there, however. We were taken care of royally.

MR. FITZGERALD.—I don't think it is a matter of imposing, and I

think that Boston men would be delighted to have the Convention there; but, when we go to a large city there is apt to be so much junketing, that the paper part, the intellectual part, sinks into insignificance, and I, for one, would rather see a Convention in a country place.

MR. BOGART.—I suppose it would be a more serious answer to the question that was addressed to me and justice to Mr. FitzGerald to say that up to some years ago our Conventions were very pleasant in cities; then we began to grow so large that it was found almost impossible to accommodate us all in one hotel; we were pretty well accommodated in one hotel at Milwaukee, except that there were a good many who were not accommodated at that hotel. The Board of Direction, for a number of years past, has come to the conclusion, after a great deal of discussion on the subject, that the place at which to hold a Convention is, if possible, at some very large watering place hotel, where they can make arrangements for the care of the whole party, men, women and children, in a proper manner and at a proper rate for doing it. In the city hotel there is always a large clientage belonging to the hotel that they are unwilling to put out of the way for the accommodation of an incidental convention party, as ours must be. We go for three or four days, and it is very difficult for the proprietors of hotels to give proper accommodation. They have told me over and over again, "We would like to have you, and will do what we can for you, but we cannot get rid of our ordinary custom; you must go two in a room, and if any one comes in before you arrive, we cannot turn him away." While it may seem silly, almost, for a scientific body to put so much stress on accommodation at a hotel for three or four days, yet the fact is, unless we do have that accommodation, the Convention is voted a failure and we had better go to some place where we can get that sort of accommodation. That is the reason why we have concluded that it is best not to go to a city.

MR. TIDD.—I do not like to be talking all the time, but I am a Boston man, and I don't like to have it understood that there are no hotels there that can take care of this Society.

THE PRESIDENT.—The question is on the passage of the resolution offered by Mr. FitzGerald, that it is the sense of this meeting that Saratoga would be a suitable place for the next Convention. (Resolution lost.)

MR. J. R. RICHARDS.—I move that it is the sense of this meeting that Fortress Monroe is a desirable place for the next Convention.

PROF. A. G. COMPTON.—Before that motion is put, I wish to say it is very evident that the sense is for some place at the seaside. I would offer Newport. Newport has accommodations; it has no mountain. It has ample hotel accommodation; they open the 1st of July; places for meeting can be found near by, or in the hotels; the climate is agreeable and I think that we can have a very pleasant time at Newport.

Mr. A. FTELEY.—I do not agree with the last speaker that the vote which was taken shows that it is the sense of the meeting that the Society should go to the seaside, but that we would not go to Saratoga. It seems to me that what the vote means is that it is not desirable to express an opinion here; it seems to express the same feeling, the same opinion, that Mr. Whinery's proposed amendment did, that the Board of Direction should be entrusted with the duty of selecting the proper place, after getting of course all the necessary information, and also after having a great deal of light thrown on the subject by the free discussion that we have heard.

The PRESIDENT.—The question is on the pending resolution, that it is the sense of this meeting that Fortress Monroe would be a suitable point for the holding of the next Convention. (Carried.)

Mr. BOGART.—Now, Mr. President, would not Mr. Whinery's resolution be in entire order?

Mr. WHINERY.—I ask now that my motion be put to the house, that the whole subject of the location of the next Annual Convention be referred to the Board of Direction. (Seconded and carried.)

The CHAIR.—The next business in order is the reading of the Report of the Board of Direction. Mr. FitzGerald has kindly consented to read it.

The Report of the Board of Direction was then read.

Mr. John Bogart, Treasurer of the Society, read the Report of the Treasurer.

Mr. CROES.—I move that the reports as read be accepted, and ordered printed. (Carried.)

The PRESIDENT.—The Secretary has an announcement to make.

The SECRETARY.—I wish to say to the members present that some little time ago I sent a notice to every member of the Society, saying that I had received a very polite note from General Casey, in which he stated that he would be glad to furnish a number of copies of reports of the Chief of Engineers to Members of the Society. I would like to have the names of any members who desire to have the reports.

The PRESIDENT.—I have received from Paris a letter dated 19th December, conveying to this Society an invitation to attend the Congress of Internal Navigation.

Mr. E. P. NORTH.—Is that next year or this year?

The PRESIDENT.—This year. I have upon the table a copy of the translation of that letter which Mr. Corthell has transmitted to the Secretary. It reads as follows:

PARIS, December 19th, 1891.

O. CHANUTE, Esq., Consulting Engineer,
No. 5 Ritchie Place, Chicago, Ill.

DEAR SIR,—In another letter of even date herewith, I have advised you of the mailing of a number of documents concerning the Fifth International Congress on Internal Navigation, which is to be held

here next year. I beg to advise you further that we would be most happy to see the largest possible number of American engineers in Paris in 1892. Their presence would greatly promote a strong reciprocity toward the Chicago Congress in 1893.

Several months ago application was made through the Minister of the United States in Paris, in order to secure, as has been done in a number of other countries, the appointment of delegates to the committee on organization of our Congress. But no result has followed and I do not know why.

We have been more fortunate in another direction. Already three of your countrymen, to whom we applied direct upon information given to Mr. Pontzen, by Mr. Corthell, have kindly promised papers upon some of the questions which are to be discussed by the Congress. These are as follows:

Mr. J. BOGART, Chief Engineer State of New York.

Concerning Towing. First, Towing on Canals; second, Towing in Slack Water Rivers; third, Towing in Flowing Rivers.

Mr. MERRILL, Col. U. S. Engineers.

Upon the Respective Utility of Water and Rail Transportation for Commercial Purposes.

Mr. E. L. CORTHELL, Civil Engineer.

Upon the Improvements of River Mouths and Harbors.

Among more than sixty papers which are promised from various countries, the three above mentioned will doubtless attract great attention, the names of their authors being a sure warrant.

In addition to discussions of the various questions included in the programme, the Congress will comprise several excursions. The details are not yet fully matured, but it is safe to say now that there will be two principal excursions, one before the Congress to the Canals and Harbors of Northern France; the other after the Congress to the Canals at Central France and to Marseilles.

It seems to me that the organization in the United States of a committee to promote the Fifth International Congress of Internal Navigation, would be the surest means of securing the attendance and co-operation of a large number of your countrymen. We would, therefore, be most thankful if, in your double capacity as President of the American Society of Civil Engineers, and President of the General Committee of Engineering Societies, which represents sixteen American societies, you would kindly take the initiative in this organization. Moreover, a circular from the above General Committee would doubtless make our Congress largely known among engineers, and would doubtless contribute by way of reciprocity, as I have already stated, to promote a greater participation by European engineers in the Congress which is to be held in Chicago in 1893.

With high consideration I beg to subscribe myself.

B. DE MAS,
The General Secretary.

It has been laid before the Executive Committee of the Association of Engineering Societies, and it is now laid before this meeting for such action as you may deem advisable to take.

Mr. BOGART.—The Secretary asks me to suggest, what I would not have thought of, that at the meeting of the Board of Direction of our Society, at which this letter, which was addressed to our President, Mr. Chanute, was considered, it was suggested that if the members of this

Society who expected to be in Europe this summer, would transmit their names to the Secretary, an appointment might be sent them (if that should be considered the best course to take), as representatives of this Society at this Congress of Interior Navigation, and it would serve two purposes: it would doubtless give those gentlemen a very pleasant opportunity of visiting in certain parts of France in company with eminent engineers, and it would also give American engineers a representation there and would aid in acquaintances which would help in 1893 when the foreign engineers come to this country. This is a convention of engineers from all countries, which was held the last time in England. Whether any action, Mr. President, should be taken at this meeting on this matter I do not know; the Board of Direction suggested that it should be brought before the Annual Meeting.

The PRESIDENT.—The suggestion of the Secretary of the Congress is that a committee should be formed in this country for the purpose of making better known the fact that the Congress is to be held and to disseminate information concerning it. I would say that various printed papers were forwarded to me at the same time as this letter, which I will have translated, and which I will place in the hands of the Secretary for printing and distribution to such members as may desire to be better informed as to what is proposed to be done at the Congress, the various subjects to be discussed, etc.

Mr. NORTH.—I would suggest that that would be a matter of interest to pretty much all of the members of the Society and that it be referred to the next Board of Direction.

Mr. T. G. SMITH.—Does it not seem proper that some answer should be made to that letter?

The PRESIDENT.—That has been done, I have answered the letter.

Mr. T. G. SMITH.—Officially?

The PRESIDENT.—No; I have made a personal answer, stating that I would bring it before the Society.

Mr. T. G. SMITH.—Would it not be a courteous thing to instruct the President to answer that letter officially?

Mr. FITZGERALD.—And to express our hearty sympathy and show our co-operative spirit.

The PRESIDENT.—Will Mr. North accept that amendment?

Mr. NORTH.—Yes, sir.

The PRESIDENT.—Are you ready for the resolution as amended?

Resolved, That the appointment of a committee to promote the Fifth International Congress of Internal Navigation be referred to the next Board of Direction, and that the President be instructed to answer the letter officially, and express the hearty sympathy and co-operation of the Society in the Congress.

The resolution was carried.

The PRESIDENT.—I desire to bring up the matter of Engineering

Headquarters at the World's Columbian Exposition, and to say in connection with the general subject, that in a very few days a circular will be issued by the Executive Committee of the General Committee of the Engineering Societies, of which this is the original draft. That committee, as you know, has already issued a circular, No. 1, stating the proposed arrangement for maintaining headquarters during the time of the Exposition and the way in which it is proposed to raise the funds, and it now issues a circular, No. 2, concerning the Engineering Congress, which reads as follows:

CHICAGO, ILL., January 14th, 1892.

EXECUTIVE COMMITTEE—CIRCULAR NO. 2.

To the Members of the General Committee of Engineering Societies :

Simultaneously with your organization to provide for engineering headquarters and an international meeting of engineers in 1893, the matter of congresses was taken up by the "World's Congress Auxiliary."

The "World's Congress Auxiliary" is an adjunct of "The World's Columbian Exposition," maintained by the latter for the purpose of promoting a series of World's Congresses in 1893. The address of the President of the Auxiliary, Hon. C. C. Bonney, to the delegates of the engineering societies which met in Chicago on the 15th of last May, will be found in the report of that meeting.

It was at that time contemplated by the "Auxiliary" that the Engineering Congress should be made a subdivision of either the department of Science and Philosophy, or of some department of applied science, but the delegates of the Engineering societies, before adjourning, passed the following resolution:

"*Resolved*, That it is the sense of this Committee, that the importance of Engineering entitles it to the place of an independent department in the World's Congresses to be held in 1893 under the auspices of the World's Columbian Exposition."

We now have the pleasure of reporting, that this recommendation has been fully accepted by the governing authorities of the "World's Congress Auxiliary"; that Engineering has been made an independent department, and that its conduct has been entrusted to a General Committee of the Auxiliary on Engineering Congresses, appointed by President C. C. Bonney, which consists practically of your own Executive Committee, already appointed by the Engineering Societies of the United States and Canada.

We enclose herewith copies of the circular of Hon. C. C. Bonney, President of the Auxiliary, stating the scope of the Engineering Department and the objects of the Auxiliary; also copies of the preliminary announcement of the General Committee of the Auxiliary on Engineering Congresses, containing a scheme of organization and of classification and a proposed order of proceedings. The following list of subdivisions indicates the classifications. It is proposed to assign the work of organization and management of the various divisions as stated below:

Division A. Civil Engineering, to American Society of Civil Engineers.

" B. Mechanical Engineering, to American Society of Mechanical Engineers.

" C. Mining Engineering, to American Institute of Mining Engineers.

Division D. Metallurgical Engineering, to American Institute of Mining Engineers.

“ E. Electrical Engineering, to American Institute of Electrical Engineers.

“ F. Military Engineering, to Engineer Officers, U. S. A.

“ G. Marine and Naval Engineering, to Engineer Officers, U. S. N.

The order of proceedings, and the list of subjects from which selections may be made for the work of the Congress, are tentative, and suggestions are cordially invited.

There will probably be occasion for several joint sessions of two or more divisions, to discuss questions of general interest, and these, together with the programme and the order of papers and discussions—to avoid duplication or mutual interference—will be in immediate charge of the General Committee of the Auxiliary, in consultation with the officers of the several divisions.

It is desired that the various bodies to whose care these several divisions are intrusted, shall take early steps toward organizing their division. Having already their own organizations and established relations, they are in the best position to begin the preparatory work at once, and to prosecute it to a successful termination with scarcely any expense.

The usual plan heretofore in vogue for organizing international congresses in Europe, has been to appoint in advance a number of Honorary Presidents, who act virtually as patrons; two chairmen and four to six vice-chairmen, to provide for unexpected disabilities; four or five Honorary Secretaries and one General Secretary; also an Advisory Council comprising both home and foreign members; in addition to which foreign and domestic kindred societies have been invited to send delegates to the Congress.

The various engineering societies to whom the several divisions are assigned, may either pursue this plan, or they may, if they prefer, organize the division through their own regular officers, making such additions thereto as suggest themselves, to give a representation to kindred organizations, etc. They may also prefer to have this Congress take the place of their regular summer meeting, including therein all local societies and delegates of engineering societies throughout the world.

All this may be done subject to approval by the General Committee of the Auxiliary, as seems best to each society, but the important part of the work to be done, would appear to be to provide in advance for the selection of interesting subjects for discussion; the preparation of analyses of subjects, and the perfecting of arrangements which will insure desirable contributions to the discussion; also the securing of valuable voluntary papers, their examination, etc., and arranging for their discussion.

These papers should be invited from engineers all over the world, in order to make the Congress truly international, and should preferably treat of new and important constructions, machines, processes, methods, etc., provided they are in actual use, or experiments and investigations including proposed standards of tests and measurements. Advance copies or abstracts will be printed at the expense of the “Auxiliary” or of the Associated Engineering Societies, as may hereafter be determined, and the papers and discussions or translations thereof, if the original be in French, German, Spanish, etc., may be included in the transactions of the society organizing the division. It is

moreover expected that they will also be printed in the publication contemplated by the "World's Congress Auxiliary," which is to furnish also the halls and rooms for holding the Congress.

While there is sufficient time for the work contemplated, during the eighteen months yet to elapse before the Congress, there is none too much. It is, therefore, hoped that the various bodies to whom the work of organizing the divisions is assigned shall enter at once upon its performance, or shall promptly notify the undersigned Executive Committee that they decline to undertake it, so that it may be assigned to other parties.

Respectfully submitted,

E. L. CORTHELL, *Chairman.*
E. M. IZARD,
WM. FORSYTH,
C. L. STROBEL,
R. W. HUNT,
J. W. CLOUD,
D. J. WHITEMORE,
Executive Committee.

Approved, O. CHANUTE,
President, General Committee.

Address all Communications to E. L. Corthell, Chairman Executive Committee, 205 La Salle Street, Chicago, Ill.

Mr. BOGART.—Mr. President, I am asked, and you can answer the question much better, to explain a little as to the organization from which that report comes.

The PRESIDENT.—Some time ago there was formed an organization of the various engineering societies of this country and the Canadian society; each society in the organization appointed a number of delegates, with their alternates; this Society has two delegates and two alternates, the local societies have one delegate each. These delegates have appointed to represent them and to take action for their associations, an Executive Committee of seven members, all resident in Chicago. This circular is issued by that Executive Committee, subject, however, to the approval of the President of the Joint Association, which is myself. The Executive Committee, with some additional members, have been appointed, also the General Auxiliary Committee, which is another organization still, the latter being maintained by the Columbian Exposition, which defrays all expenses of printing circulars, etc., so that practically there is an Executive Committee representing the associated engineering societies, which acts in a double capacity, either as Executive Committee of the engineering societies, or as Governing Committee of the Engineering Congress of the Columbian Exposition.

Mr. BOGART.—Mr. President, it seems proper that I should answer a question which has been asked in regard to the progress of the subscription made by members of this Society toward the expenses of the Engineering Headquarters and the Engineering Congress to be held at the World's Columbian Exposition at Chicago. The Joint Committee, the organization of which our President has explained, made an esti-

mate of the probable necessary funds for carrying out the plans suggested; and the amount which it was thought this Society, with its present number of members, should fairly contribute, was \$3 000. A circular has been issued to every person connected with this Society, stating this and asking for such contribution as he thought proper to make. That circular was issued, I think, in November last, or the first of December. There have been eighty-eight subscriptions made from 1 500 members. These are simply cold facts that I am giving you. I am acting as Treasurer of this fund. There have been eighty-eight subscriptions, and the total amount subscribed has been \$816; we are not very far along toward the \$3 000. Of these subscriptions there has been one of \$100, one of \$50, four of \$25, one of \$20, and the rest are \$10, \$5 and \$3. If the Society membership is to bear its quota of this fund something more must be done. The step that was taken in issuing the circular was determined upon by the Board of Direction upon these considerations, among others: first, that this was an exceedingly desirable matter, and that it was fair that the civil engineers of the country should bear their share. There will be provided there an engineering headquarters which will be of the greatest advantage to every engineer visiting that exposition. Those of us who were at the Philadelphia Exposition will remember that the arrangements made there for an engineering headquarters were a very great comfort. That part alone would warrant, it seems to me, a subscription by the large membership of this Society. The average which is assigned to it is only \$2 apiece, but, as you see, this circular has been out a month and only eighty-eight have subscribed.

A MEMBER.—That is pretty good for the first notice.

Mr. BOGART.—The suggestion is a most excellent one. There ought to be more notices sent out. I appreciate also that it is a good while before the Exposition; but, on the other hand, it is fair to the committee which is taking this matter up and taking it up in an unselfish way that there should be some idea of what they can depend upon from the membership of this Society before it is too late.

Now, the Board of Direction also concluded that this ought to be a subscription by the membership of this Society, and that it was not proper that the Board of Direction should appropriate any of the Society funds to this purpose; that is the reason for sending out the subscription paper, and that is the reason that the Board of Direction and the Joint Committee think that there will be a response at least equal to the amount assigned to this Society as its fair share, which is only \$2 apiece. Of course, if the rest of the Society subscribe in the proportion that these eighty-eight men have, there will be more.

Mr. T. G. SMITH.—I have been appealed to by a number of our members to know how much they ought to give. I suppose at least twenty men have said to me "How much ought we to give?" At Buf-

falo, especially, several have spoken to me about it, and they have asked me to learn what would be a proper amount. One gentleman said he was willing to give a hundred dollars, but he did not want to give more than his share. All they want to know is what do you want. Can you give them any idea?

MR. BOGART.—That is one of the reasons why I give all this information.

MR. TIDD.—This is the first intimation that I have had that any circular had been issued. I could not respond under such circumstances.

THE SECRETARY.—One has been sent to every member of the Society.

MR. BOGART.—A most pertinent suggestion has just been made to the Treasurer by the gentleman behind me; that is, that a place and opportunity will be provided at this meeting for anybody who wants to subscribe.

MR. TIDD.—There is another question: How soon is the money needed? As the gentleman has suggested, it may seem a long time beforehand, but there are also arguments why it should be subscribed at once. There may be people who would subscribe if they knew how soon it would be needed.

MR. BOGART.—That was all considered by the Board of Direction. Experience in subscriptions, not payments, in several cases in the past, even with members of this Society, has not been pleasant. The difference of interest will be very small on any individual subscription. I suppose that if any person chose, as two persons have, to say he would subscribe, but was not willing to pay until 1893, I suppose that would be entirely acceptable. I do not know when the money is wanted by the General Committee, but the assurance of the money is needed very soon. If the gentleman feels he can pay a hundred dollars next year for ten now, that is the kind of subscription we want.

MR. TIDD.—I think I never did subscribe without paying the cash down.

THE CHAIR.—I may say that no great amount of money will be needed until about the 1st of January or February, 1893. That is, it is proposed to organize in advance of the opening of the Exposition, and at the time of that opening to have in full operation the house in the business center of Chicago, which can be made the home of the visiting engineers, both foreign and domestic. In addition to that, we are promised adequate rooms for headquarters within the Exposition buildings themselves, which, as you probably know, are 7 miles from the center of the city, and there a staff will be maintained who will conduct visitors about and furnish them information. The great expenditure will be made between the months of May and October, but some moneys will have to be expended before; and, in any event, before undertaking obligations the committee will desire to be well assured that there will be no financial disappointment.

MR. ROBERT CARTWRIGHT.—Mr. President, would it not be desirable to have that subscription made as soon as possible, rather than to dribble it along until 1893, when a great many will have forgotten it? We have it right here on the walls (pointing to the Chinese texts) that “he who gives quickly gives twice.”

MR. FTELEY.—It seems to me that this discussion has thrown a great deal of light on this question, and in view of the discussion, I think it would be a proper matter for the Board of Direction to issue another circular, specifically emphasizing the fact that the authorities at Chicago must know just where they stand, and consequently we must have prompt answer, although the money may not be forthcoming in some time. I do not doubt that that circular will bring a great many more responses, I do not know but that it will bring my response.

MR. BOGART.—Mr. President, the Secretary asks me to say that our Chief Clerk, Mr. Lee, will have the subscription-book, and any information that is required, during the session of the annual meeting, and he can be seen.

THE PRESIDENT.—If there is no objection, we will now hear the report of the tellers on the ballot for officers for the ensuing year.

The report was read by Mr. Downes, as follows:

The following is the vote:

For President: Mendes Cohen, 349; J. J. R. Croes, 1; Blank, 1.

For Vice-Presidents for two years—Non-Resident: Samuel Whinery, 348; J. J. R. Croes, 2; A. P. Boller, 1; V. G. Bogue, 1. *Resident:* Charles B. Brush, 343; A. Fteley, 1; Walter Katté, 2; E. P. North, 1; Blank, 3.

For Vice-Presidents for one year—Non-Resident: Samuel M. Gray, 350; John MacLeod, 351; Blank, 1.

For Directors for three years—Non-Resident: William P. Craighill, 348; Desmond FitzGerald, 350; Abraham Gottlieb, 348; Benjamin M. Harrod, 350. *Resident:* Leffert L. Buck, 350; John Thomson, 348; James Dunn, 2; Onward Bates, 1; F. D. Fisher, 1; J. R. Freeman, 1; George H. Thomson, 1; Blank, 6.

For Directors for two years—Non-Resident: Theodore N. Ely, 350; Robert Moore, 351; P. Alex. Peterson, 349; Robert L. Read, 348. *Resident:* George W. McNulty, 350; John G. Van Horne, 348; Latham Anderson, 1; W. A. Haven, 1; Clemens Herschel, 1; John Kennedy, 1; Blank, 5.

For Directors for one year—Non-Resident: Estevan A. Fuertes, 347; Albert B. Hill, 350; Edmund T. D. Myers, 348; James D. Schuyler, 350. *Resident:* Charles H. Myers, 350; John G. Van Horne, 348; A. P. Boller, 1; A. Bonzano, 1; George H. Mendell, 1; C. W. Hunt, 1; Blank, 9.

For Secretary—Resident: Francis Collingwood, 348; E. P. North, 1; Blank, 2.

For Treasurer—Resident: John Bogart, 336; George S. Baxter, 1; A. P. Boller, 1; J. J. R. Croes, 3; C. C. Martin, 2; D. McN. Stauffer, 3; Blank, 5.

Total number of votes received.....	359
Not entitled to vote.....	1
Without signature	7
	— 8
Found correct and counted.....	351
Necessary for choice.....	176
O. ERLANDSEN,	
D. S. CARLL,	
S. B. DOWNES, <i>Chairman.</i>	
<i>Tellers.</i>	

The PRESIDENT.—Gentlemen, this is the report of the tellers. I announce the election, for President, of Mr. Mendes Cohen; for Vice-Presidents for two years, Charles B. Brush and Samuel Whinery; for Vice-Presidents for one year, Samuel M. Gray and John MacLeod; for Secretary, Francis Collingwood; for Treasurer, John Bogart; for Directors for three years, Leffert L. Buck, William P. Craighill, Desmond FitzGerald, Abraham Gottlieb, Benjamin M. Harrod, John Thomson; for Directors for two years, Theodore N. Ely, George W. McNulty, Robert Moore, O. F. Nichols, P. Alex. Peterson, Robert L. Read; for Directors for one year, E. A. Fuertes, Albert B. Hill, Charles H. Myers, James D. Schuyler, John G. Van Horne.

Mr. MENDES COHEN, President Am. Soc. C. E.—Mr. President, I would like to express to you, sir, and to my fellow-members of the Society, my acknowledgment and thanks for the distinguished honor which they have conferred upon me. I am quite conscious that it is rather due to their partiality than to any merits of mine that they have selected me for this position. Possibly it is due to some unfounded notion that they may have of my zeal in the past for the furtherance of the Society's interests. I certainly have taken much interest in its progress, and I can only promise them that in this position of President in which they have placed me, I shall certainly do my best to maintain the influence and dignity of the Society.

On motion, a recess was taken until 15 o'clock for lunch, at the Society House.

AFTERNOON SESSION.

The PRESIDENT.—The meeting will please come to order. The Secretary will make an announcement.

The SECRETARY.—I have received a very courteous letter from Mr. Williams, the Secretary of the Engineers' Club, offering the courtesies of the club for ten days to members of the Society present. Cards will be distributed to members desiring them.

The PRESIDENT.—The next proceeding is the report of the Committee on Units of Measurement, Mr. Thomas Eggleston, Chairman.

Mr. THOMAS EGLESTON.—The report that I have to make is very short and is as follows:

The Committee on Units of Measurement beg respectfully to report that they have spent a large part of the year in obtaining information, and that they will shortly address to each member of the Society a circular, asking for opinions and information upon various subjects which they have been asked to discuss, and they therefore beg to report progress and ask to be continued.

THOS. EGLESTON, *Chairman*.
GEO. M. BOND.

The PRESIDENT.—If there be no objection, it will be so ordered.

At our meeting this morning we had the pleasure of listening to the report of the Committee on Standard Time, with the understanding that any members who might desire to discuss it would have an opportunity of doing so. I think this would probably be as good a time as any to discuss the report, if any members are prepared to add anything on the subject.

Dr. EGLESTON.—As a member of that Committee who was not present this morning, I beg to say that I have read that report and that I fully agree in everything relating to it, and I beg to acknowledge here my indebtedness, as the Society has already acknowledged its indebtedness to the Chairman of the Committee, Mr. Sanford Fleming, for the able way in which he has carried on the work of the Committee, and I also desire to add my testimony to the great value of the work Mr. Fleming has done. Having seen on two continents, the past year, a great deal of the result, and having passed over the Canadian Pacific recently, where they are using the system, and having found how very useful it is, I now beg, as a member of this Society, to offer the following resolution, if it is in order.

The PRESIDENT.—It will be in order.

Whereas, The several reports of the Special Committee on Uniform Standard Time establish that the movement for reforming the time system of the world has made substantial progress in the three continents of America, Asia and Europe; and

Whereas, The railroad companies of America were the first to recognize the value of the reform and bring into practice the hour zone system; and

Whereas, It appears that a large majority of prominent railroad men are in favor of the early adoption of the 24-hour notation; and

Whereas, It would be advisable to bring the new notation into use in railroad administration throughout the country within the present year; and

Whereas, The shores of the New World were first sighted by Columbus on October 12th, 1492; and

Whereas, The 24-hour notation is essentially Italian in its historical origin and it would be a graceful compliment to the land which gave birth to the illustrious discoverer, to adopt the new notation on the four hundredth anniversary of the day upon which he first saw land appertaining to the Western Continent;

Be it thereupon Resolved, That the proper steps be taken to invite all the railroad companies of the United States, Canada and Mexico to adopt the 24-hour notation on the 12th day of October next.

The PRESIDENT.—Gentlemen, you have heard the resolution read and it is seconded, any remarks thereon would now be in order. If there be no remarks, are you ready for the question?

Mr. ROBERT MOORE.—I would like to ask if the Committee has had any consultation with the officers of the railway companies with respect to the probability of its being carried out. Of course that is not conclusive in any way.

Dr. EGLESTON.—I offer the resolution, not as a member of the Committee, but as a member of the Society. I may say, for myself, and from my own experience in the matter, and I have been actively engaged in it since the Committee was first appointed, I think there is a fair prospect of its being adopted. What it wants is some one to take the first step.

Mr. WHINERY.—I would like to know of the Committee what practical methods it suggests for bringing about this action. Of course it cannot be done from the action of this Society alone, but would need the co-operation of other bodies. It seems to me we ought to have some line of action outlined by which this can be made effective, or put in the way of being made effective.

Mr. FLEMING.—I might remark that this resolution was not composed by the Committee, but as Chairman I am very glad indeed to see that it is moved here, because I think the time is not far distant when some definite action should be taken. The Secretary has communicated with a very large number of railway managers throughout the country and I have received a great number of replies. The replies indicate that there is a very general feeling in favor of the new notation and an exceedingly small percentage of the replies indicate that there are any adverse to it. It requires some one to take the initiative, and as this Society has been prominent in promoting the movement, I think it is very proper that it should take the initiative. The date proposed is some nine months from now, and there will be ample time to communicate with all the railway managers and induce them to adopt the change proposed.

A MEMBER.—I would amend the resolution so as to make it read:

“Such steps as the Committee to whom that subject has been assigned shall deem necessary,” giving the Committee the power to act in the matter.

This amendment was accepted by Dr. Eggleston.

The PRESIDENT.—The resolution will then read:

“Be it therefore resolved that such steps be taken as the Committee on Standard Time may deem necessary, to invite all the railway companies in the United States, Canada and Mexico to adopt the twenty-four-hour system on the 12th day of October next.” (Carried.)

The Secretary then made some announcements respecting the evening session to be held at the Society House, and the excursion for the next day.

The PRESIDENT.—We will now hear the report of the Committee on Uniform Methods of Testing, Mr. G. Bousearen, Chairman.

Mr. J. G. DAGRON (of the Committee) said: This is the report of the Committee appointed at the annual meeting two years ago to consider the matter of Uniform Methods of Tests of Materials used in Metallic Structures and on the requirements with which such materials should comply.

Mr. DAGRON then read the report.

The PRESIDENT.—Gentlemen, you have heard this report. The Committee seems to have done a large amount of very interesting work and they ask for more time to perfect it. In the meantime, I suppose that the preliminary report will be printed in due course and some time set for discussion.

Mr. A. P. BOLLER.—I move that the report be accepted and the Committee continued. (Carried.)

A MEMBER.—Will the report be circulated for discussion?

The PRESIDENT.—That I understand is the intention.

The SECRETARY.—The usual course for these reports is that they be printed, and as the Committee is continued, the proper course would be for any person who desires to discuss it to send their discussion to the Committee.

Mr. R. W. HUNT.—I think, as a member of the Committee, it was quite the desire of this Committee that the report should be discussed. We hope in that way to get a much fuller amount of information in answer to our circulars.

Mr. E. P. NORTH.—I move that a meeting be appointed to discuss that report, it having been printed and sent out to members previously. (Seconded.)

The PRESIDENT.—It is moved and seconded that the Board of Direction be requested to appoint some evening for the discussion of this report, which is to be previously printed.

Mr. CHARLES B. BRUSH.—On that motion, unless there is some special business to be brought before the Society, there are no doubt some here who would like to discuss this matter now, and you may not have those gentlemen at the meeting of the Society which is set apart for the discussion. If there is time, I think it would be well to have that discussion now.

The PRESIDENT.—I would state for the information of the meeting that there is one more report to be read, that on Standard Rail Sections, which I understand to be ready. The meeting may either listen to that report and discuss either or both reports, which will then have been read; or it may prefer to appoint some future meeting for the discussion of those reports.

Mr. G. BOUSCAREN.—The Secretary of the Committee will state to the meeting what has been done.

Mr. R. W. HUNT.—Mr. President, your Committee is not prepared to make a written report yet, or a final one. There has been a large amount of correspondence and we have made a great deal of progress, and brought out a great deal of information, and when the report is ready it will be valuable and meet the approval of the Society as well as the engineering world. Therefore we respectfully ask permission to report progress and that the Committee be continued.

The PRESIDENT.—I was led to infer that we were going to be favored with the final report.

Mr. R. CARTWRIGHT.—Would it not be better, in the light of the fact that we are here to-day, and we may not be able to be at the special meeting to discuss this matter, would it not be better to have the discussion of the report on tests now?

The PRESIDENT.—As we are not to be favored with the full report of the Committee on Standard Rail Sections, I am of the opinion that the course proposed would be the best course, that is, to discuss at once the report which has just been read. If the gentleman who offered the resolution will withdraw it we will proceed with the discussion.

Mr. HUNT.—Are we to be discharged or continued?

The PRESIDENT.—We want to have the resolution as to discussion withdrawn first, so that we may then receive the report of the Committee on Rail Sections.

A MEMBER.—Let me object to the withdrawal of that resolution. It would be an advantage to hear from the members here now in addition to what any one may say afterward.

The PRESIDENT.—The resolution can again be offered at any time after the discussion.

Mr. CARTWRIGHT.—I would like to see the Committee continued and kept on with their methods of testing, but I think this is a very ambiguous report to make. I do not think you can establish any empirical law for testing material, and so far as regards the determining the length of the section that the tests shall be made upon is concerned, I consider it foolish. I have seen in my practice (which required a large amount of heavy material) a sheet from which a coupon had been cut off and tested, and which had been received by the Government; yet an empty car drawn across that sheet broke it in two, after it had stood all the Government tests. Now you can take the same material, and in one case it will give you a tensile strength double what it will in another, solely due to the manner of working. I have taken a bar of iron for bridge chords that has been checked guaranteed 60 000 pounds tensile strength and have broken it in two at a strain below the guaranteed test of 60 000 pounds. I have then taken that same broken part and an inch section has stood 96 000 pounds tensile test. It is like a barrel of flour;

your wife may take it and be successful in making good bread, and the same thing in the hands of some one else may not be fit to eat. The manipulation, the temperature at which you pour, the manner in which you fill your mould, there are a thousand and one things that may intervene. The constituents are well enough, it is well enough to analyze it chemically, but the manipulation has more to do with it.

I think we can get more information on the subject right here, from those who are practically operating the material, than to leave it for discussion hereafter. Right here I would refer to our tests that we were obliged to make in making a great many tons of material, where we were required to guarantee such and such strength. The mixtures were made to give us that and we carried it out successfully, buying, as we thought, the same iron, it was sold for the same iron, and yet no two specimens were alike. We all know that anything like iron is good for some things, and good for nothing for others. We know that Salisbury iron is good in some places and not in another. In some of our work not long ago, the specifications came to us from Washington to make the cylinders of Salisbury iron. Is there any man who would think of making a steam cylinder of Salisbury iron? We use it for the tire of a railroad wheel because it takes a deeper chill, but it is not worth a row of pins for a steam cylinder. We can take soft irons and make a mixture that will be worth a dozen of Salisbury iron. We made the first cylinder of Salisbury iron, we had to, and it cracked up 2 feet; of course it was condemned, and then we made a mixture that made a good steam cylinder.

Mr. HENRY B. SEAMAN.—You spoke of a piece that broke from a car wheel rolling over it; was it a steel or an iron plate?

Mr. CARTWRIGHT.—Steel plate.

Mr. ROBERT MOORE.—The last speaker suggested a question, that is, the extent to which the propriety has been considered of testing the raw material before it is worked, and the testing of it after it had been worked and put into the final shape. I think this is a very important matter, because some years ago, when the manufacturers of bridges got together and made their specifications, which have been quite extensively used, they prepared a method of tests of the raw material and hardly any at all for the finished material, although since then one of those manufacturers made a special request to me that no test of the material should be required, except of the finished material, so that some manufacturers seem to have experienced a change of mind. Now I do not gather the opinion of the committee in regard to that question, from anything in their report; perhaps they can give it.

Mr. CARTWRIGHT.—In regard to testing raw material, that is foolish, in my estimation. I may be considered a heretic, but the proof of the pudding is in eating the string. You take pig iron or scrap, and it is perfectly possible to make your iron worth nothing, in the moulding or

in the pouring, just as possible as anything else. I had occasion recently, at a blast furnace, to ask an expert there, who could take his chemical analysis and make water pipe right from the blast furnace and in a single operation. (I don't think there is a man who is practically acquainted with iron who would think of doing that.) I asked him where he got his best iron from the draw; he said, "from the top." We all know better than that.

The PRESIDENT.—Does any other gentleman want to make any remarks on the report of the Committee?

Mr. SEAMAN.—Is there not a motion before the house regarding this report?

The PRESIDENT.—I understood that had been withdrawn to permit this discussion.

A MEMBER.—I move, then, that a meeting be set apart for the discussion.

The PRESIDENT.—It is moved and seconded that the Board of Direction be requested to set apart an evening for the discussion of the report of this Committee, which is to be previously printed. (Carried.)

The PRESIDENT.—We will now consider the report of the Committee on Standard Rail Sections, which came a little out of its time; it was intended to call it after this discussion was over. You have heard, however, the report of the Committee, that they have accumulated a large amount of material, that they are not ready to report, and that they ask further time.

Mr. MOORE.—I move that the Committee be continued and granted further time. (Carried.)

The PRESIDENT.—The Secretary informs me that this is all the business which has been planned for this meeting. What is the further pleasure of the members?

A MEMBER.—I move that we adjourn. (Seconded.)

Mr. BRUSH.—Is there any motion before the house?

Mr. COHEN.—Mr. President, does that mean an adjournment of the Annual Meeting, or only an adjournment for the present time?

The PRESIDENT.—I understand it to be an adjournment of the Annual Meeting. When we now adjourn we shall adjourn the Annual Meeting. There is a meeting to-night.

Mr. CARTWRIGHT.—Is there any business before the meeting?

The PRESIDENT.—No, sir.

Mr. CARTWRIGHT.—Has there been any arrangement or any discussion in relation to the entertainment of the Engineers who come over to the Exposition in 1893, to entertain them in return for their kindness to us in England and France, etc.? I am asking for information.

The PRESIDENT.—The Secretary will answer that.

The SECRETARY.—In reference to the question, perhaps you did not hear what took place this afternoon. That action will be taken upon

this subject by the incoming Board. The work is outlined, but they will carry it out.

The incoming President asks me to request the members of the incoming Board to meet, as many of them as can, at the Society House to-night for an informal meeting. Those who are present will please remain for a short time.

The PRESIDENT.—I will put the question. Those in favor of the adjournment of this Annual Meeting please say aye.

Adjourned.

EVENING SESSION.

Twenty o'clock.—Mr. Robert Moore described the Elevated Railroad in St. Louis; and Messrs. Thomas E. Brown, Jr., and G. H. Blakeley described the New Passenger Elevator and Iron Viaduct of the North Hudson Company Railway, at Weehawken, N. J.

The remarks on both these structures were fully illustrated by stereopticon views.

On Thursday an excursion was made by boat to Weehawken, where, by the courtesy of Mr. Charles B. Brush, Chief Engineer; Mr. Thomas E. Brown, Jr., Consulting Engineer, and Mr. G. H. Blakeley, Engineer for the contractors, the new passenger elevator and viaduct were inspected. From there the reservoir, pumping station and high service tower of the Hackensack Water Company were visited.

Returning to the steamer the party proceeded to the Navy Yard (lunch being served on board). Here, under the escort of Civil Engineer P. C. Asserson, U. S. Navy, M. Am. Soc. C. E., and other officers, the following vessels were inspected: The armored cruisers *Maine* and *Cincinnati*, now under construction; the new double-turreted armored ship *Miantonomah*; the dynamite cruiser *Vesuvius*, and the torpedo boat *Cushing*. In the machine and boiler shops were seen two pairs of marine engines building for the cruisers *Cincinnati* and *Raleigh*. The ordnance shops were also visited, and the new quay wall now in course of construction in concrete and stone.

In the evening a reception for gentlemen was held at the Society House.

The members of the Society of the various classes, 232 in number, present at the Annual Meetings, excursions, etc., were: Henry C. Allen, Thomas W. Allen, James C. Anderson, P. C. Asserson, John W. Bacon, Fred. H. Baldwin, William Henry Baldwin, Charles B. Ball, Carroll Ph. Bassett, John Q. Barlow, Charles J. Bates, George Baum, Arthur Beardsley, Leonard F. Beckwith, William E. Belknap, John A. Bense, Charles E. Billin, George H. Bishop, H. Bissell, George H. Blakeley, John Bogart, Alfred P. Boller, George M. Bond, Charles P. Bonnett, G. Bouscaren, A. Bonzano, C. W. Bradley, W. H. Bradley, A. G. Brinckerhoff, H. Waller Brinckerhoff, W. H. Breithaupt, Josiah A.

Briggs, Thomas E. Brown, Jr., Frank Bruen, Charles B. Brush, Charles W. Buchholz, L. L. Buck, Andrew Bryson, H. D. Bush, David S. Carll, Robert Cartwright, W. A. Cattell, O. Chanute, E. J. Chibas, L. Russell Clapp, St. John Clarke, Thomas C. Clarke, Edward B. Codwise, Amory Coffin, Mendes Cohen, Howard J. Cole, Francis Collingwood, Oren B. Colton, Silas G. Comfort, Alfred G. Compton, C. B. Comstock, E. H. Connor, Casimir Constable, S. L. Cooper, Theodore Cooper, Joseph P. Cotton, William P. Craighill, J. James R. Croes, J. Foster Crowell, F. S. Curtis, James G. Dagron, Frederic Danforth, Chandler Davis, Joseph P. Davis, Rob B. Davis, E. P. Dawley, Charles H. Deans, John Sterling Deans, A. Dempster, George Devin, S. L. F. Deyo, P. P. Dickinson, Stanciliff B. Downes, Thomas Egleston, O. Erlandsen, Herbert C. Felton, Francis D. Fisher, Sandford Fleming, Desmond Fitzgerald, John D. Fouquet, Louis D. Fouquet, James B. Francis, A. Fteley, J. R. Furman, M. L. Gardner, Henry H. Gladding, William Gibson, Jr., Charles E. Goad, E. H. Goodman, H. Stanley Goodwin, Charles S. Gowen, Charles H. Graham, Thomas H. Grant, Samuel M. Gray, William Gray, George Sears Greene, G. S. Greene, Jr., Stephen S. Haight, George R. Hardy, Charles M. Harris, Robert L. Harris, E. W. Harrison, Bentley D. Hasell, William J. Haskins, James D. Hawks, Rudolph Hering, Clemens Herschel, Albert B. Hill, Francis L. Hills, S. Willett Hoag, Jr., Frank W. Hodgdon, Henry W. Hodge, R. L. Hoxie, Charles Warren Hunt, Robert W. Hunt, William R. Hutton, Walter Katté, Gustav Kaufman, Herbert C. Keith, Cassius W. Kelly, John Kennedy, C. S. Kelsey, George A. Kimball, Joseph M. Knap, W. H. Lawton, Jr., G. Leverich, James F. Lewis, G. Lindenthal, Horace Loomis, Thomas D. Lovett, Edward E. Magovern, William W. Maclay, Henry Manley, O. J. Marstrand, Charles C. Martin, Thomas H. McCann, David E. McComb, Walter McCulloh, S. B. McKee, T. H. McKenzie, George W. McNulty, Henry C. Meyer, Robert Moore, Mace Moulton, Charles H. Myers, E. T. D. Myers, E. T. D. Myers, Jr., Charles E. Newham, O. F. Nichols, Edward P. North, Ellis B. Noyes, A. S. Nye, Jr., L. F. Olney, John F. O'Rourke, James Owen, Charles Paine, A. McC. Parker, P. A. Peterson, Edward F. Playle, Henry G. Prout, Benjamin Reece, Joseph R. Richards, Thomas F. Richardson, Robert Ridgway, E. P. Roberts, Percival Roberts, Jr., Thomas Rodd, J. C. L. Rogge, Charles B. Rowland, Thomas F. Rowland, William Rumble, George M. Rusling, J. Gardner Sanderson, Charles C. Schneider, Henry B. Seaman, Alfred F. Sears, George F. Simpson, Frank W. Skinner, Merritt H. Smith, Jr., T. Guilford Smith, Charles Sooy-smith, H. S. Speidel, D. McN. Stauffer, Horace E. Stevens, William J. Stewart, R. C. St. John, Edmund C. Stout, W. H. G. Temple, Gaylord Thompson, S. C. Thompson, George H. Thomson, John Thom-

son, T. Kennard Thomson, George A. Tibbals, Samuel G. Tibbals, M. M. Tidd, Calvin Tomkins, A. T. Tomlinson, G. M. Thompson, E. E. Russell Tratman, John C. Trautwine, Jr., L. L. Tribus, W. G. Triest, John G. Van Horne, Downing Vaux, Maurice A. Vielé, C. I. Walker, Charles D. Ward, R. Willard Ware, Albert L. Webster, Edward Wegmann, Jr., A. M. Wellington, E. B. Weston, Schnyler S. Wheeler, S. Whinery, Thomas D. Whistler, W. Howard White, Frank O. Whitney, W. F. Whittemore, William H. Wiley, James K. Wilkes, William G. Wilkins, C. J. H. Woodbury, Paul L. Wolfel, William E. Worthen, Preston K. Yates and H. W. York.

OF THE BOARD OF DIRECTION.

JANUARY 4TH, 1892.—Action was taken as to members in arrears. The draft of the Annual Report was considered. Arrangements were made as to the Annual Meeting.

The names of Messrs. Allan Campbell, M. Am. Soc. C. E., of New York City, and William C. Young, of Chicago, were presented for election to Honorary Membership. Applications were considered.

Mr. George Baum, of Paterson, N. J., was elected a Junior.

JANUARY 14TH, 1892.—The Annual Report was read, amended and approved. Reports of the Finance Committee, Library Committee and the Treasurer presented. Report of the expert accountant was considered. Applications were considered.

JANUARY 19TH, 1892.—The Annual Report was considered, accepted and approved, and ordered printed for distribution and read at the Annual Meeting. The Treasurer and Chairman of the Finance Committee reported they had purchased one \$1000 Rio Grande Western Railroad First Mortgage 4 per cent. Fifty-Year Gold Bond, cost \$773.75; also one \$1000 Pittsburgh and Western Railroad First Mortgage 4 per cent. Gold Bond, cost \$818.75.

The reports of the Finance Committee, Library Committee and the Treasurer were presented, adopted and ordered printed for distribution and read at the Annual Meeting. The report of the expert accountant was received and placed on file.

JANUARY 21ST, 1892.—In accordance with the provisions of the Constitution, the following Standing Committees were appointed:

On Finance.—Messrs. Charles B. Brush, Charles H. Myers, L. L. Buck, S. Whinery and William P. Craighill.

On Library.—Messrs. G. W. McNulty, John G. Van Horne, Samuel M. Gray, Theodore N. Ely and E. T. D. Myers.

On Publications.—Messrs. O. F. Nichols, John Thomson, Desmond FitzGerald, P. A. Peterson and A. B. Hill.

The following resolution was adopted:

Resolved, That a Committee on Applications for Membership be appointed to consist of ten members, three resident and seven non-

resident, whose duty shall be to collate and condense the correspondence respecting applications for membership, for presentation to the Board. The Committee shall meet at such time as may be agreed upon, at which one shall be a quorum.

The following Committee was appointed: Messrs. John Thomson, Charles B. Brush, Robert Moore, E. A. Fuertes, L. L. Buck, B. M. Harrod, John MacLeod, A. Gottlieb, Robert L. Read and James D. Schuyler. The time and place of the Annual Convention were considered. The name of James B. Francis, Past President Am. Soc. C. E., was presented for election to Honorary Membership.

REPORT OF THE BOARD OF DIRECTION FOR THE YEAR ENDING DECEMBER 31st, 1891.

PRESENTED AT THE ANNUAL MEETING, JANUARY 20TH, 1892.

The Board of Direction, in compliance with the provisions of the Constitution of the Society, presents its Report for the year ending December 31st, 1891.

MEMBERSHIP.

On January 1st, 1892, the membership stood as follows :

Honorary Members, resident..	4	Non-resident...	1	Total...	5
Corresponding Members.....	—	“	... 3	“	3
Members, resident	190	“	... 918	“	1 108
Associate Members, resident ..	9	“	... 40	“	49
Associates, resident.....	19	“	... 44	“	63
Juniors, “	59	“	... 162	“	221
	—		—	—	1 441
Making, resident.....	281	Non-resident..	1 168		—
Total.....					1 449
Fellows, 54, of whom 5 Members are included above, leaving.....					49
Subscribers to the Building Fund, 140, of whom 83 are entered in some one of the classes above, and 19 are deceased, leaving...					38
					—
Total connected with the Society, January 1st, 1892					1 536

At the date of the previous Annual Report, January 1st, 1891, the membership was as follows :

Honorary Members, resident..	4	Non-resident..	3	Total...	7
Corresponding Members.....	—	“	3	“	3
Members, resident	200	“	880	“	1 080
Associates, “	17	“	44	“	61
Juniors, “	57	“	158	“	215
				—	1 356
Making, Resident.....	278	Non-resident.	1 088		—
Total.....					1 366
Fellows, 56, of whom 5 Members are included above, leaving.....					51
Subscribers to the Building Fund, 140, of whom 83 are entered in one or other of the classes above, and 19 are deceased, leaving					38
					—
Total connected with the Society, January 1st, 1891.....					1 455

The additions during the past year have been :

Honorary Members	—
Members.....	60
Associate Members.....	49
Associates.....	10
Juniors.....	36
Fellows.....	1
	—
Total additions.....	156

The losses during the year in each class have been :

Honorary Members, died 2	2
Members..... “ 12 resigned.....	10
	dropped for non-payment of dues. 10
	32
Associates..... “ 2 “ “ “ “ 3	
	transferred to Member..... 3
	8
Juniors..... “ resigned.....	2
	dropped for non-payment of dues 4
	transferred to member..... 7
	“ “ Assoc. Member... 17
	30
Fellows..... “ 3	3
	—

Totals : Deaths, 19 ; Resignations, 12 ; Dropped, 17 ; Transfers, 27.....Total... 75

There has been an addition of 156, and a loss of 75, making the actual net increase for the year, 81.

On January 1st, 1891, there were, as stated in the last Annual Report, 29 applications for membership pending ; 213 applications have been received during the year ; 52 candidates have been elected Mem-

bers, of whom 3 were transferred from Associates, and 7 from Juniors ; 55 candidates have been elected as Associate Members, of whom 17 were transferred from Juniors ; 10 candidates have been elected Associates ; 36 candidates have been elected Juniors ; 1 candidate has been elected Fellow. Applications now pending, 73, of which 30 are now before the Society on the current ballot and blue lists.

Elected candidates have qualified in the several grades as follows: as Members, 60 ; as Associate Members, 49 ; as Associates, 10 ; as Juniors, 36 ; as Fellow, 1 ; 1 candidate elected during the year as Member, 6 as Associate Members, and 3 as Juniors have not yet qualified.

It will be seen that while 29 applications were pending at the beginning of the year, and 213 have been received during the year, there have been 159 elections to all classes, and there are still pending 73 applications.

There have been 8 rejections of candidates by the Society on the letter ballots ; and 2 elections of rejected candidates on a ballot for reconsideration.

The remainder of the difference between the applications received and the elections, is due to the fact that the Board of Direction insists that the record of every candidate shall show clearly that his qualifications are such as the Constitution requires for admission to the class applied for, before passing him to ballot. When any doubt exists as to the proper disposition of an application, inquiries are made of members who may be able to give information, resulting often in an extensive correspondence before final action is taken.

It is a duty incumbent on every member to give the Board early information of any facts bearing upon the character or experience of applicants, which would properly either entirely prevent their admission to the Society, or show their incompetency for the grade of membership applied for. The blue lists are sent out some time in advance and to every grade of membership, especially for this purpose; and it is not treating the Board or an applicant justly to allow the blue list (or advance notices) to pass without comment, and then to cast a black ball when voting. Success in maintaining a high standard of membership depends largely upon the hearty co-operation of the members with the Board in its efforts in this direction.

In this connection, owing to a recent occurrence, it seems to be necessary to remind the members, that the Constitution of the Society distinctly provides for the admission of *Architects*, and Engineers in *every* branch of the profession, mechanical, marine, electrical, etc. This has been the rule throughout the whole history of the Society. Architects in good standing have always been eligible for membership ; and especially at the present time, an architect competent to design and execute the complicated details of one of the large buildings now becoming so common in all large cities, is surely the peer of other engineers.

On March 4th, 1891, the revised Constitution came into force. The radical changes in the organic law thus inaugurated increased largely the labors of the Board of Direction, as it had, among other things, to define on new lines the qualifications of all candidates. Other new and novel questions also presented themselves, owing to the fact that this year the Society affairs were in a state of transition from the old order to the new, and the Board of Direction was consequently confronted with the necessity of deciding a number of doubtful points which will not present themselves again.

The new rules as to the qualifications of members tend to check the election of members to the highest grade, but the Board believes it is in full accord with the wishes of the membership in enforcing a rigid interpretation of the Constitution. The requirement that for the two higher grades letters of indorsement shall be received from each of the references given, is found to work well in practice. Owing, however, to the lack of prompt replies from the referees in all cases, action by the Board is sometimes delayed for a considerable time.

With the entrance upon their duties, of officers to be elected at this meeting, all the requirements of the Constitution will be complied with. The law of the State requires that on a change in the number of the Trustees of a chartered organization, a certificate of the number and names of Trustees elected under the new law shall be signed by a majority of the present Board, and filed in the office of the Secretary of State, and also in the office of the County Clerk. Such certificates have been prepared and will be executed as soon as the election of officers shall have been declared.

This Society has joined with others for the purpose of maintaining headquarters in Chicago during the Columbian Exposition of 1893; the object being to assist and inform visiting Engineers, both foreign and American. The expense is estimated at \$15 000, of which the share of this Society is \$3 000. It is also expected that an International Engineering Congress will be held in Chicago some time during the Exposition. Information thus far gathered indicates that we shall be visited by many foreign Engineers during the Exposition year (1893), and that this will be a good time to discharge part of our debt to the European Societies which entertained so magnificently such of our members as visited Europe in 1889. Arrangements for this purpose will have to be perfected by the next Board of Direction.

The labor in the office of the Society is largely increased by the frequent change of location of members, and is much more than is ordinarily supposed. As a rule, members are careful to give prompt notice of such changes, but there are exceptions which cause great embarrassment and make it impossible to serve the delinquents satisfactorily.

The Board is convinced that the employees have all performed their duties faithfully during the past year.

The Secretary reports that he has been able to give the names of applicants for positions to inquiring employers in quite a number of cases. In so doing he has been very careful to be entirely impartial, and furnish *all* names in every case, of applicants whose records showed them at all capable of filling the positions offered.

The Secretary reports also that he has answered many inquiries for information on various topics, which he has been requested to obtain from the Library. It should be remembered that every member is at liberty to make inquiry of the Secretary on any engineering topic. A charge is made when lengthy abstracts are required, such as would need the employment of some one especially to make them.

The house of the Society was purchased in 1880 for \$30 000; \$14 000 of the sum was paid by subscription, leaving \$16 000 of debt, on which it pays 5 per cent. interest. It has been suggested that a certain definite part of the income of the Society should be devoted annually to the reduction of this mortgage. The Board has, however, during the past year (as has been done previously), concluded that the best interests of the Society would be served by devoting the bulk of the current income to the development of the work of the Society, trusting that eventually the debt will be met by *bequests* and special funds otherwise obtained. The interest on the debt is not a serious charge, and there are so many ways in which it is desirable to expend the income, which will tend to attract new members and be of advantage to those now in the Society; that the Board believes the policy of restriction which must ensue if the plan proposed of paying off the debt be adopted at the present time, would not be advisable and would seriously retard the advancement of the Society.

Among the measures requiring an increase in funds for its adoption, the Board has taken into consideration the publication of well digested Abstracts of all foreign and home engineering literature; not mere notices, but at sufficient length to give a clear idea of the contents. Such a plan, to be successfully carried out, requires the payment to abstractors of a moderate remuneration for work done, and the Board does not think it wise to inaugurate it until it can safely incur this expense together with that of printing. Estimates indicate that the total cost would be in the neighborhood of \$3 000 per year.

The Board calls attention to a recommendation of the Committee on Library in reference to a proposed change in the method of printing and issuing the publications of the Society. This recommendation was recently made to the present Board, and on account of the important character of the proposed change, the subject has been referred to the incoming Board.

The Society has lost by death during the term covered by this report two Honorary Members: Moncure Robinson and Sir John Hawkshaw; twelve members: Addison Connor, Charles E. Fogg, John M. Goodwin,

Julius E. Hilgard, Arthur Macy, William E. Merrill, Samuel H. Miller, J. Albert Monroe, Richard Potts, Samuel B. Reed, James R. Wardlaw and Arthur Owen Wilson; two Associates: John Lockwood and Edward Wheaton; three Fellows: A. P. Cochran, John Lawler and William L. Scott.

MEETINGS OF THE SOCIETY.

Twenty meetings have been held during the year, one of which was the Annual Meeting, held in New York, January 21st and 22d, and another, the Annual Convention, held at Lookout Mountain, Chattanooga, May 21st to 26th. All the sessions of the Convention, including the business meeting, are counted as one meeting of the Society.

Fourteen meetings of the Board of Direction have been held during the year.

THE NORMAN MEDAL AND THE ROWLAND PRIZE.

A Gold Medal of the value of seventy dollars, and the Rowland Prize of fifty dollars, have been awarded as shown by the following list. The reports of award for the past year will be announced at this meeting.

- 1874. Medal awarded to J. James R. Croes, for paper on "Construction of a Masonry Dam."
- 1875. Medal awarded to Theodore G. Ellis, for paper on "Description and Results of Hydraulic Experiments with large Apertures."
- 1877. Medal awarded to William W. Maclay, for paper on "Notes and Experiments on the Use and Testing of Portland Cement."
Book Prize awarded to Julius H. Striedinger, for paper on "Igniting Blasts by Means of Electricity."
- 1879. Medal awarded to Edward P. North, for paper on "The Construction and Maintenance of Roads."
Book Prize awarded to Max E. Schmidt, for paper on "The South Pass Jetties."
- 1880. Medal awarded to Theodore Cooper, for paper on "The Use of Steel for Bridges."
- 1881. Medal awarded to L. L. Buck, for paper on "The Re-enforcement of the Anchorage and Renewal of the Suspended Structure of the Niagara Railroad Suspension Bridge."
- 1882. Medal awarded conjointly to A. Fteley and F. P. Stearns, for paper on "Experiments on the Flow of Water in the Sudbury River."
- 1883. Medal awarded to William P. Shinn, for paper on "The Increased Efficiency of Railways for the Transportation of Freight."
ROWLAND PRIZE awarded to G. Lindenthal, for paper "Rebuilding the Monongahela Bridge."

1884. Medal awarded to James Christie, for paper on "Experiments on the Strength of Wrought Iron Struts."
ROWLAND PRIZE awarded to Hamilton Smith, Jr., for paper on "Water Power with High Pressures and Wrought Iron Water Pipe."
1885. Medal awarded to Eliot C. Clarke, for paper on "Record of Tests of Cement Made for the Boston Main Drainage Works."
ROWLAND PRIZE awarded to A. M. Wellington, for paper on "Experiments with New Apparatus on Journal Friction at Low Velocities."
1886. Medal awarded to Edward Bates Dorsey, for paper on "English and American Railroads Compared."
1886. ROWLAND PRIZE awarded to Charles C. Schneider, for paper on "The Cantilever Bridge at Niagara Falls."
1887. Medal awarded to Desmond FitzGerald, for paper on "Evaporation."
ROWLAND PRIZE awarded to William Metcalf, for paper on "Steel; its Properties; its Use in Structures and in heavy Guns."
1888. Medal awarded to E. E. Russell Tratman, for paper on "English Railroad Track."
ROWLAND PRIZE awarded to Clemens Herschel, for paper on "The Venturi Water Meter; An Instrument making use of a new Method of gauging Water, applicable to the Cases of very large Tubes, and of small Value only, of the Liquid to be Gauged."
1889. Medal awarded to Theodore Cooper, for paper on "American Railroad Bridges."
ROWLAND PRIZE awarded to James D. Schuyler, for paper on "The Construction of the Sweetwater Dam."
1890. Medal awarded to John R. Freeman, for paper on "Experiments Relating to the Hydraulics of Fire Streams."
ROWLAND PRIZE awarded to O. Chanute, John F. Wallace and William H. Breithaupt, for paper on "The Sibley Bridge."

By order of the Board of Direction,

F. COLLINGWOOD, *Secretary.*

APPENDIX I.

REPORT OF THE LIBRARY COMMITTEE.

Your Committee reports that they have been charged with the care of the Society's House, the publication of the Papers read before the Society, and with the care of the Library.

SOCIETY HOUSE.

The House has been kept in repair throughout the year; and under the advice of Albert L. Webster, Assoc. M. Am. Soc. C. E., who kindly volunteered his services, the plumbing has been thoroughly renewed.

PUBLICATIONS.

At the commencement of its term of service the Committee successfully renewed the efforts of preceding Committees to have the Post-Office Department recognize the publications of the Society as second class matter, and the Transactions and Proceedings for the year 1891 went out at pound rates. This change has effected a saving of \$729.28 for the year in postage, 10 950 pounds of publications having been sent out as second class matter.

Your Committee also requested bids from several printing firms for furnishing paper, printing and binding the Society's publications, and a new contract was made with the Evening Post Job Printing Co.; effective as to about half of this year, resulting in a moderate reduction on the prices previously paid, which cannot be exactly estimated, as letting the contract involved the comparison of many different items, some of which were new, and others of which replaced or modified items in the previous contract.

During the year beginning December 1st, 1890, twenty meetings of the Society have been held, at which fifty-seven Papers have been read, which have been discussed either orally or in writing by 235 persons. These have been printed in 12 monthly numbers, covering 1 227 pages, illustrated by 219 cuts and 178 plates. The Proceedings, containing minutes of meetings, notices, annual list of members, etc., have covered 376 pages. There have also been issued an Index to Vols. I to XXI of the Transactions (inclusive), covering 272 pages, and the Annual Catalogue, with the Constitution, etc., of 134 pages.

The cost of the Society's publications, including author's copies, advance copies and extra papers, the Index and the Catalogue, as mentioned, also reprinting 500 copies of the Transactions of February, 1874, has been as follows:

Paper, printing and binding.....	\$8 438 56
Tracings, engraving and printing cuts, plates and maps.....	3 905 60
For directing and mailing and for postage, the items are :	
10 905 pounds of second class matter.....	109 05
Foreign and other at ounce rates.....	232 18
The charges for clerk's and stenographer's services to this account have been ..	972 13
Paid for directing wrappers	60 00
<hr/>	
Making a total expense to the Society of.....	\$13 717 52
From this the following items should be subtracted:	
Subscriptions and sales of papers.....	\$1 374 07
Received for advertisements.....	1 396 00
<hr/>	
	2 770 07
<hr/>	
Making the net cost to the Society for the year's publications.....	\$10 947 45

This statement has been prepared for the information of the members, to show the distribution of the moneys expended for publications. It does not correspond with the Treasurer's account, as the number for December, 1891, was not issued, and it covers the year from December 1st, 1890.

Two thousand copies of the Transactions are regularly printed, of which about three hundred are preserved for future need. There are also printed from one hundred and fifty to three hundred advance copies of each Paper, and from one hundred to five hundred single copies of the completed Papers with discussions, according to the request of the authors (and for which they pay a part of the cost).

Much of the time of the Secretary and the office force is occupied in correspondence, proof reading and various matters connected with the Papers, Discussions and Transactions.

Your Committee has increased the number of advance Papers sent out, and the resulting discussions have justified the additional expense. It is hoped that arrangements will be made (see recommendations below as to the Society's publications) by which any member or subscriber interested in a subject can obtain advance copies in time to join in the discussions.

THE LIBRARY.

Your Committee applied to the Board of Direction for the sum which would probably be saved on the postage account, for the increased maintenance of the library, and \$850 was appropriated. In addition to this, Messrs. Chanute, Wallace and Breithaupt, who were awarded

the Rowland prize for their paper on the Sibley Bridge, elected to return the amount of the prize into the Library fund, and a set of the Century Dictionary was purchased with the money so given and a small additional sum. The expenditures from this appropriation have been for the Century Dictionary, a set of the Encyclopedia Britannica, and completing files of current technical papers and binding them and unbound transactions of Engineering and Technical Societies; also for binding such other books as were in danger of damage.

The amount expended for missing numbers of periodicals has been..... \$64 50
 And for binding three hundred and eighteen volumes of periodicals and books, mostly reports of various governments, has cost..... 477 75

There are also thirty-six volumes now in the hands of the binder.

The Society has publications of the following societies and journals, bound and complete, with the exceptions noted :

- American Institute of Electrical Engineers. Complete from the beginning.
- American Institute of Mining Engineers. Complete from the beginning.
- American Society of Mechanical Engineers. Complete from the beginning.
- Annales des Ponts et Chausees, Paris. Complete from the beginning, except years 1863 to 1868, which are ordered.
- Architectural Magazine, 1834 to 1838. 5 vols.
- Association of Engineering Societies. Complete from the beginning.
- British Association for the Advancement of Science. Complete from the beginning to 1856.
- Civil Engineer and Architects' Journal. Complete from the beginning, 1837 to 1868.
- Corps of Royal Engineers, London. Complete from 1844 to 1849.
- The Engineer, London. Complete from the beginning.
- Engineers' Club of Philadelphia. Complete from the beginning.
- Engineering, London. Complete from the beginning.
- Engineering Record (prior to 1887, The Sanitary Engineer). Complete from Vol. IV, 1880.
- Engineering News, New York. Complete from Vol. VI, 1878.
- Franklin Institute, Philadelphia. Complete from the beginning.
- Industries, London. Complete from Vol. III, 1887.
- Institution of Civil Engineers, London. Complete from the beginning.
- Institution of Mechanical Engineers, London. Complete from 1861.
- Institute of Engineers and Shipbuilders in Scotland. Complete from the beginning.
- Iron and Steel Institute, London, Eng. Complete from the beginning, except Part I, 1873 (out of print).
- Liverpool Engineering Society. Complete from the beginning.
- Mechanics' Magazine, London. Complete from 1844 to 1858.
- Mining Institute of Scotland, Hamilton, Scotland. Complete from the beginning.
- North of England Institute of Mining and Mechanical Engineers, Newcastle-on-Tyne. Complete from Vol. XVIII, 1869.
- Poor's Manual, New York. Complete from 1872-73.
- Practical Mechanics' Journal, Glasgow. Complete from the beginning, 1848 to 1868.
- Professional Papers on Indian Engineering. Complete from 1872 to 1876.
- Railroad Gazette, New York. Complete from Vol. VI, 1874.
- Railroad Journal, New York. Complete from the beginning, 1832 to 1867.
- Reports of Chief of Engineers, U. S. Army. Complete from 1866.
- Royal Society of Canada. Complete from the beginning.

Société des Ingenieurs Civils, Paris, France. Complete from the beginning, except number for July and August, 1855.
 Society of Engineers, London, Eng. Complete from 1864.
 Technical Society of the Pacific Coast. Complete from the beginning.
 Van Nostrand's Engineering Magazine. Complete from the beginning.
 Zeitschrift für Bauwesen. Complete from Jahrgang XXXI, 1881.

The additions to the Library by donations and exchanges have been :

Bound volumes	87
Pamphlets	312
Maps.....	91
Photographs.....	39
Blue Prints and Lithographs.....	44
Specifications.....	186

Making a total of 759 titles

This gives us some 15 000 volumes and pamphlets in the Library.

During the year notices of new books, sent to us by publishers for that purpose, mentioning the size, number of pages, contents and price, with the publisher's name, but without expressing an opinion of the value of the books mentioned, have been made in our Proceedings. This has resulted in an addition of sixteen volumes to our Library.

We have received during the year either by exchange or from the publishers, the following publications, files of which have in many instances been preserved for many years.

A Magyar Mernök-es Epitesz-Egylet Kozlönye Budapest, Hungary. Monthly and Weekly.
 Akademie des Bauwesens, Berlin.
 American Architect and Building News, Boston, Mass. Weekly.
 American Engineer, Chicago, Ill. Weekly.
 American Gas Light Journal, New York. Weekly.
 American Institute of Architects, New York. Annual.
 American Institute of Electrical Engineers, New York. Monthly.
 American Institute of Mining Engineers, New York.
 American Society of Mechanical Engineers, New York.
 Annales des Ponts et Chausees, Paris. Monthly.
 Argentine Scientific Association, Buenos Ayres. Monthly.
 Army and Navy Journal, New York. Weekly.
 Association des Ingenieurs, Gand, Belgium.
 Annales des Travaux Publics, Paris. Monthly.
 Austrian Society of Engineers and Architects, Vienna.
 Architecture and Building, New York. Weekly.
 American Manufacturer and Iron World, Pittsburgh. Weekly.
 The Builder, London. Weekly.
 Building News and Engineering Journal London. Weekly.
 Building and Engineering Journal, Melbourne, Australia. Weekly.
 Bulletin of the American Iron and Steel Association, Philadelphia. Weekly.
 Boston Society of Civil Engineers, Boston.
 Bureau of Statistics of Labor, Boston.
 California Academy of Science, San Francisco, Cal.
 Canadian Society of Civil Engineers, Montreal, Canada.
 Canadian Institute, Toronto, Can.
 Civil Engineers' Club of Cleveland, Cleveland.
 Civil Engineers' Society of St. Paul, St. Paul, Minn.
 Colorado Agriculture College, Fort Collins, Col.

Colombian Society of Engineers, Bogota. U. S. Colombia.
 Colegio Nacional Rosales, Culiacan, New Mexico.
 Cornell University, Ithaca, N. Y.
 Colliery Engineer, Scranton, Pa. Weekly.
 Cassier's Magazine, New York. Monthly.
 Der Civilingenieur, Leipzig. Monthly.
 Deutsche Bauzeitung, Berlin. Weekly.
 Denver Society of Civil Engineers and Architects, Denver, Col. Weekly.
 Ecole Polytechnique de Delft, Delft, Holland.
 Electrical World, New York. Weekly.
 Electrical Engineer, New York. Weekly.
 The Engineer, London. Weekly.
 Engineering, London. Weekly.
 Engineering Magazine, New York. Monthly.
 Engineering News, New York. Weekly.
 Engineering and Building Record, New York. Weekly.
 Engineering and Mining Journal, New York. Weekly.
 Engineers' Society of Western Pennsylvania, Pittsburgh.
 Engineering Association of the South, Nashville, Tenn.
 Engineers' Club of St. Louis, St. Louis.
 Engineers' Club of Kansas City, Kansas City, Mo.
 Engineers' Club of Philadelphia, Philadelphia.
 Engineering Association of New South Wales, Sydney, N. S. W.
 Franklin Institute, Philadelphia. Monthly.
 Illustrated Official Journal of Patents, London. Weekly.
 Indian Engineering, Calcutta, India. Weekly.
 Industries, London. Weekly.
 Institution of Civil Engineers, London.
 Institution of Engineers and Shipbuilders in Scotland. Glasgow.
 Institute of Mechanical Engineers, London.
 Institute of Engineers, Hague, Holland.
 Iron, London. Weekly.
 Iron Age, New York. Weekly.
 Iron and Steel Institute. London.
 Journal of Gas Lighting, London. Weekly.
 Junior Engineering Society, London.
 Light, Heat and Power, Philadelphia. Weekly.
 Le Genre Civil, Paris. Weekly.
 Liverpool Engineering Society, Liverpool.
 L'Industria, Milan, Italy. Weekly.
 Massachusetts Institute of Technology, Boston. Quarterly.
 Manufacturer and Builder, N. Y. Monthly.
 Mechanics, Philadelphia. Monthly.
 Mechanical News, New York. Semi-Monthly.
 Midland Institute of Mining, Civil and Mechanical Engineers, Barnsley, Eng.
 Mining Institute of Scotland, Hamilton, Scotland.
 Minnesota Society of Civil Engineers.
 Military Service Institution, Governor's Island, N. Y. Bi-Monthly.
 New York Meteorological Observatory.
 North of England Institute of Mining, Mechanical Engineer, Newcastle on Tyne.
 Norsk Teknisk Tidsskrift, Christiania, Norway.
 Nouvelles Annales de la Construction, Paris. Monthly.
 Ohio Society of Surveyors and Civil Engineers, Massillon, Ohio.
 Poor's Manual, New York. Monthly.
 Portefeuille Economique des Machines, Paris.
 Railway Age, Chicago, Ill. Weekly.
 Railway Engineer, London. Monthly.
 Railway Review, Chicago, Ill. Weekly.

Railway World, Philadelphia. Weekly.
 Railway Master Mechanic, Chicago, Ill. Weekly.
 Railroad Gazette, New York. Weekly.
 Railroad and Engineering Journal, New York. Monthly.
 Revue Générale des Sciences, Paris.
 Revue Générale des Chemins de Fer, Paris. Monthly.
 Record of Scientific Literature, N. Y. Monthly.
 Rensselaer Polytechnic Institute, Troy, N. Y. Monthly.
 Royal United Service Institution, London. Monthly.
 Rigasche Industrie Zeitung, Riga, Russia. Semi-Monthly.
 Society of Engineers and Architects, Dresden, Germany.
 Scientific American, New York. Monthly and Weekly.
 Scientific American Supplement, New York. Weekly.
 School of Mines, Columbia College, New York. Quarterly.
 Society of Arts, London. Weekly.
 Society of Engineers, London.
 Société des Ingenieurs Civils, Paris. Monthly.
 Stevens Institute of Technology, Hoboken, N. J. Quarterly.
 Street Railway Journal, Chicago. Monthly.
 Street Railway Review, Chicago. Monthly.
 Society of Engineers and Architects, Hannover.
 Technical High School, Aachen.
 Technical High School, Hannover.
 Technical Society of the Pacific Coast, San Francisco.
 Teknisk Tidskrift, Stockholm, Sweden. Monthly.
 Telegraphic Journal and Electrical Review, London. Monthly.
 The Locomotive, Hartford. Monthly.
 U. S. Coast Survey, Washington.
 U. S. Department of Agriculture, Washington.
 U. S. Department of State, Washington.
 U. S. Geological Survey, Washington.
 U. S. Lighthouse Board, Washington.
 U. S. Naval Institute, Annapolis, Md. Quarterly.
 U. S. Navy Department, Washington.
 U. S. Ordnance Department, Washington.
 U. S. Patent Office, Washington.
 U. S. Surgeon-General's Office, Washington.
 University of the City of New York, New York.
 Van Nostrand Company, New York.
 Verein Deutscher Eisenhüttenleute, Dusseldorf. Monthly.
 Verein Deutscher Ingenieure, Berlin. Monthly.
 Water Supply Department, Melbourne, Aus.
 Zeitschrift der Oesterreichischen Ingenieure und Architekten Vereins, Vienna.
 Zeitschrift für Bauwesen, Berlin.

LOANING BOOKS.—This question has always given trouble, as there has often been great difficulty in procuring the return of books loaned and some files seem permanently broken by the persistent neglect of members to return numbers borrowed. In view of this danger to the Library, which seems a growing one, the Library Committee recommended the following resolution, which was adopted by the Board of Direction:

“Resolved, That no books, pamphlets, maps, drawings or models shall be taken from the Society House unless with the consent of at least five members of the Board of Direction, and not without a deposit covering the full value thereof.

“No publication belonging to a series shall be taken from the Society House, but this does not apply to books, etc., left on deposit, which shall be subject to the owners' orders.

“A copy of this resolution is to be sent to every member and to be posted in the Library of the Society.”

This will, undoubtedly, prove an inconvenience to many who return books carefully as well as to those who are utterly careless, but it will avoid inconvenience to users of the library.

In this connection it might be stated, on what is thought competent counsel, in regard to books which are wanted in court, that a Judge can require the production of any book he deems necessary, but he cannot require it to pass out of the custody of its owner, or to be left in court.

The Library Committee also recommends that the publications of the Society be divided into two classes, viz.:

A. A semi-monthly periodical containing The Proceedings of the Society, viz., notices of meetings, minutes of the past meeting and a summary of the Papers to be read, with any other information the Secretary wishes to impart.

B. A quarterly publication containing the Transactions of the Society, viz., Papers and discussions.

If the Transactions are issued quarterly and bound in stout paper, they will save the trouble of binding in some instances, and it will be possible in general to present the whole of a paper and the accompanying discussions in the same number. At the same time by issuing the Proceedings semi-monthly the Secretary will be in much closer connection with the members, and the summaries of the Papers will enable all members and subscribers to know what is coming before the Society, and place themselves in a position to participate in its discussion if desired, by writing for advance copies.

The Library of this Society is now very valuable, containing some 15 000 titles of books, pamphlets and maps, many of which it would be impossible to duplicate, besides models of historic value. But it has depended heretofore on gifts from its members, exchanges with other Societies and with Government Departments, and it is incomplete in every department; and your Committee would suggest to the Society that its members can do a great deal toward the completion of, particularly the historic portion of the library, by forwarding to the Secretary copies of any reports relating to the history of public works in this or any other country, which may be in their possession, and by notifying the Secretary promptly when such books are offered for sale.

The first person to make any considerable contribution to the library was William Y. Arthur, of Brooklyn, Member, December 4th, 1867. Since that it has been enriched by contributions from the libraries of William J. McAlpine, James P. Kirkwood and J. B. Francis, Past Presidents, William A. Talcott, S. S. Post, James B. Eads, Sullivan Haslett, Joseph P. Davis, Mendes Cohen, Edward A. Flint and many others.

It is suggested by the committee that members can do a considerable service to their profession by leaving their books, more particularly reports and descriptions of works, to the Library of this Society, where they will be preserved, and serve the double purpose of adding to available knowledge and keeping green the memory of the giver. Also by sending municipal and other reports, together with the floating pamphlets containing prospectuses and projects of new works.

Under the new Constitution, the Library Committee, as heretofore organized, will cease after the current election, and two committees, one on Library and one on Publications, will take its place. This will enable the Committee on Publications to give undivided attention to procuring valuable Papers for the consideration of the Society, while the Library Committee can devote their whole attention to increasing the number of books and their proper classification and disposition.

RUDOLPH HERING,
Chairman Library Committee.

APPENDIX II.

REPORT OF THE COMMITTEE ON FINANCE.

The Finance Committee has the honor to report that it has performed the duty of auditing all the bills which have been paid during the past year, and has found that each bill has been charged to its proper fund, and that the several sums paid have not exceeded the amounts appropriated by the Board of Direction for the purposes specifically mentioned.

The Committee has also seen that the investments, transfers and deposits have been made as detailed in the report of the Treasurer.

An expert accountant has been selected by the Board of Direction as required by the new Constitution, and he is still engaged in an examination of the accounts and financial books of the Society. Sickness has prevented the completion of his work. When completed it will be submitted to the new Board of Direction for consideration.

CLEMENS HERSCHEL,

Chairman of Committee on Finance.

REPORT OF THE TREASURER FOR THE YEAR ENDING DECEMBER 31st, 1891.

RECEIPTS.

Balance on hand December 31st, 1890..... \$2 565 36
Entrance Fees..... \$3 125 00

Current Dues:

From 141 Resident Members.....	\$3 467 50
“ 712 Non-Resident Members.....	10 482 50
“ 8 Resident Associate Members.....	177 50
“ 40 Non-Resident Associate Members.....	320 00
“ 19 Resident Associates.....	277 50
“ 38 Non-Resident Associates.....	375 00
“ 43 Resident Juniors.....	622 50
“ 155 Non-Resident Juniors.....	1 495 00
	<hr/> \$17 217 50

Past Dues:

From 24 Resident Members.....	\$705 00
“ 100 Non-Resident Members.....	2 184 42
“ 1 Resident Associate.....	15 00
“ 2 Non-Resident Associates.....	20 00
“ 6 Resident Juniors.....	90 00
“ 11 Non-Resident Juniors.....	165 00
	<hr/> 3 179 42

Advance Dues:

From 50 Resident Members.....	\$1 250 00
“ 183 Non-Resident Members.....	2 728 45
“ 1 Resident Associate Member.....	25 00
“ 2 Non-Resident Associate Members.....	30 00
“ 2 Resident Associates.....	30 00
“ 14 Non-Resident Associates.....	140 00
“ 13 Resident Juniors.....	180 00
“ 15 Non-Resident Juniors.....	150 00
	<hr/> 4 533 45
	<hr/> 24 930 37

From sales of Publications.....	1 374 07
“ Certificates of Membership.....	140 25
“ Advertisements.....	1 396 00

Interest:

On Pennsylvania R. R. Bonds.....	\$660 00
“ New York Croton Aqueduct Stock.....	70 00
“ Chicago and Northwestern R. R. Bond.....	50 00
“ Consolidated Gas Stock.....	50 00
“ Union Trust Co. Deposit.....	215 57
	<hr/> 1 045 57

Compounding Dues.....	575 00
From Fellowship Fees.....	250 00
“ other sources.....	50 75
	<hr/> 32 887 01

\$35 452 37

DISBURSEMENTS.

Interest on Mortgage.....	\$800 00	
Taxes.....	434 00	
Publications	12 830 17	
Stationery and Printing.....	1 272 42	
Postage.....	1 484 48	
Library.....	2 041 94	
Salary of Secretary.....	3 000 00	
Convention and Annual Meeting.....	1 575 63	
Janitor.....	660 00	
House Supplies and Furniture.....	447 86	
Fuel.....	249 50	
Water.....	18 00	
Gas.....	167 59	
Certificates of Membership.....	74 75	
Insurance.....	49 40	
Norman Medal and Rowland Prize.....	121 55	
Treasurer's Books, Accounts, Collections.....	1 200 00	
Work of Committees.....	203 80	
Repairs and Betterments, Society House.....	537 92	
Other Expenditures.....	507 98	
Current Business.....	2 114 80	
		<hr/>
Balance in hands of		\$29 791 79
Secretary for Current Expenditures.....	\$1 000 00	
In Bank and Trust Company and hands of Treasurer.....	4 660 58	
		<hr/>
		5 660 58

\$35 452 37

The compensation paid to each person in the service of the Society during the past year is stated below, and also the several accounts to which these payments have been distributed by the Finance Committee:

John Bogart, Secretary, January 1st-21st.....	\$169 36	
Francis Collingwood, Secretary, January 21st-December 31st.....	2 830 64	
	<hr/>	\$3 000 00
Charged to Salary of Secretary.....		3 000 00
		<hr/>
Thomas B. Lee, Chief Clerk.....		\$1 449 00
Charged to Publications.....	\$297 00	
Current Business.....	851 50	
Annual Meeting and Convention .	221 00	
Contingencies	34 50	
Stationery and Printing	25 00	
Work of Committees.....	20 00	1 449 00
	<hr/>	<hr/>
M. T. Jefferis, Assistant Librarian :		
Charged to Library.....		\$1 126 67
		<hr/>
John H. Bogart, in charge Books and Accounts :		
Charged to Books and Accounts		\$700 00
		<hr/>
John Bogart, Treasurer ; Payments made for Books and Accounts:		
Charged to Books and Accounts.....		\$500 00
		<hr/>
E. G. Crans, Stenographic Reporter.....		\$378 26
Charged to Annual Meeting and Convention .	\$225 23	
Publications.....	153 03	378 26
	<hr/>	<hr/>
R. J. Dunn, Stenographer and Typewriter.....		\$760 00
Charged to Publications.....	\$159 75	
Current Business.....	441 25	
Annual Meeting and Convention..	67 25	
Contingencies	40 00	
Work of Committees.....	51 75	760 00
	<hr/>	<hr/>

B. J. Burke, Clerk.....		\$890 98
Charged to Publications.....	\$275 35	
Current Business	495 98	
Annual Meeting and Convention.	49 00	
Work of Committees.....	40 65	
Contingencies	30 00	890 98
<hr/>		
Charles H. Beyer, Office Boy.....		\$227 00
Charged to Publications	\$66 00	
Current Business	114 00	
Annual Meeting and Convention.	5 00	
Contingencies	42 00	227 00
<hr/>		
Wm. Hogan, Temporary Clerk.....		\$58 00
Charged to Annual Meeting and Convention.	\$18 00	
Work of Committees	40 00	58 00
<hr/>		
A. P. Folwell, Temporary Assistant to Secretary :		
Charged to Annual Meeting and Convention.....		\$75 05
L. B. Bonnett, Temporary Assistant to Secretary :		
Charged to Publications.....		21 00
<hr/>		

The total amount of compensation paid to all persons in the service of the Society during the year was, as above stated..... \$9 185 96

This amount was distributed by the Finance Committee to the following accounts :

Salary of Secretary.....	\$3 000 00	
Financial Books and Accounts	1 200 00	
Library	1 126 67	
Publications.....	972 13	
Current Business	1 902 73	
Annual Meeting and Convention.....	660 53	
Contingencies	146 50	
Work of Committees	152 40	
Stationery.....	25 00	
<hr/>		\$9 185 96
		<hr/>

The Funds of the Society are as follows:

Fellowship Fund:

Ninety-five subscriptions to December 31st, 1890.....	\$10 400 00
Premium and accumulated interest, December 31st, 1890	1 388 28
<hr/>	

Fund on hand December 31st, 1890.....	\$11 788 28
One subscription during 1891	250 00
Interest received during 1891.....	570 00
	<hr/>
	\$12 608 28
Expended for publications during 1891.....	570 00
	<hr/>
	\$12 038 28
	<hr/>
The present investment of this Fund is:	
Nine Pennsylvania Railroad General Mortgage Bonds,	
cost	\$11 111 82
Part of one Chicago and Northwestern Bond, Five per	
cent., cost.....	926 46
	<hr/>
	\$12 038 28
	<hr/>
Norman Medal Fund:	
One Certificate Croton Aqueduct Stock, New York	
City.....	\$1 000 00
	<hr/>
Building Fund:	
Receipts previous to December 31st, 1885.....	\$17 842 00
	<hr/>
Expended:	
For Payment on Purchase of Property.....	\$14 000 00
For Improvement on Property.....	3 486 97
For Legal Services, Circulars, etc.....	355 03
	<hr/>
	\$17 842 00
	<hr/>
Fund for Enlarged Building:	
Receipts from subscriptions.....	\$8 029 50
Expended on Enlargement.....	8 029 50
	<hr/>
Rowland Prize Fund:	
One Pennsylvania Railroad General Mortgage Bond,	
Six per cent., cost.....	\$1 222 50
	<hr/>
Compounding Fund:	
Three payments @ \$325	\$975 00
Seven “ @ 250	1 750 00
	<hr/>
	\$2 725 00
	<hr/>

The present investment of this Fund is:

One Pennsylvania Railroad General Mortgage Bond, Six per cent., cost.....	\$1 222 50
Part of one Chicago and Northwestern Five per cent. Bond, cost (balance of this Bond in Fellowship Fund).....	108 54
Ten Shares Consolidated Gas Company of New York, cost.....	972 50
Cash	421 46
	<hr/> \$2 725 00 <hr/>

Respectfully submitted,

JOHN BOGART,

Treasurer.

REPORT OF THE SPECIAL COMMITTEE ON UNIFORM STANDARD TIME.

AMERICAN SOCIETY CIVIL ENGINEERS,
NEW YORK, January 20th, 1892.

The committee at the last annual meeting gave expression to the belief that their labors were drawing to a close. and that they would soon have the satisfaction of respectfully asking to be discharged.

The movement for placing the reckoning of time on a scientific basis was first considered by the American Society of Civil Engineers in 1881, when this committee was appointed to carry out the wishes of the Society with respect thereto. By the nature of the question many interests were involved, and they were not confined to one locality; every country on the face of the globe was concerned in the satisfactory solution of the problem which the Society was pleased to place in special charge of the committee. It may be well at this stage to review in a few brief words the work of the committee from the beginning. The subject of Uniform Standard Time for railway, telegraph and civil purposes generally was submitted for consideration on June 15th, 1881, at the summer convention of the Society, held in Montreal, when the following special committee was appointed: Sandford Fleming, of Ottawa (Chairman); Charles Paine, of New York; Theodore N. Ely, of Altoona, Pa.; T. M. Toucey, of New York; Professor J. E. Hilgard, of Washington; Professor T. Egleston, of New York; General T. G. Ellis, of Hartford, Conn.

It was with deep regret that the committee lost two of its members. —(1) General Ellis, who died January 9th, 1883, and (2) Professor Hilgard, who resigned owing to impaired health in 1888.

Mr. Frederick Brooks, of Boston, was added to the committee in January, 1889. With these exceptions no change has been made in the personnel of the committee since it was appointed in the first instance, nearly eleven years ago.

1. At the annual meeting in January, 1882, the committee reported at some length, pointing out difficulties in the way and the means of overcoming them. Resolutions were passed by the Society authorizing the action to be taken. A pamphlet of 34 pages was issued and widely circulated throughout the United States, Canada and Mexico. With the pamphlet, which fully explained the nature of the investigation, a series of questions was issued, to which replies were invited.

2. In May, 1882, the committee reported at the summer convention of the Society, held at Washington, and presented a synopsis of the replies to questions received up to that date. The Society resolved to adopt the recommendation of the committee that steps be taken to obtain the establishment of a zero meridian, which would be common to all nations for reckoning time and longitude, and that the Congress of the United States be petitioned to take such action as may be necessary to attain the end sought.

3. The committee reported at the annual meeting in January, 1883, that Congress had passed a joint resolution authorizing the President to call an International conference to fix on a prime meridian, to be used in common throughout the world for reckoning time and longitude. The committee likewise presented to the Society all replies to the questions relating to standard time which had been received. These questions were embraced in a pamphlet of 131 pages. Resolutions were passed at the annual meeting instructing the committee as to their duties, and urging that a convention of railway authorities and others be held to determine a system of standard time for North America.

4. The committee reported at the convention held at St. Paul and Minneapolis, in June, 1883, pointing out the progress made.

5. At the annual meeting in January, 1884, the committee reported that the railway authorities had met at Chicago in the previous October, and agreed to adopt the system of standard time recommended by the committee, and that the new system had actually gone into effect throughout the country generally.

6. At the convention held at Buffalo, in June, 1884, the committee made certain recommendations respecting another reform in time reckoning—the notation of the twenty-four hours in a single series, abandoning the expressions ante and post meridian.

7. At the annual meeting in January, 1885, the committee reported that on the invitation of the President of the United States an International Conference had been held at Washington in the previous October, that twenty-six civilized nations had been represented by delegates, and that they had with substantial unanimity agreed on the meridian of Green-

wich as the Prime Meridian for the world, and had passed resolutions in harmony with and confirming the principles of time reckoning favored by this Society.

8. The committee reported progress at the annual meeting in January, 1886, in the matter of the movement for adopting the 24-hour notation.

9. At the summer convention held at Denver in July, 1886, it was announced that the Canadian Pacific Railway had been opened and that the 24-hour notation had been adopted in operating the line from Lake Superior to the Pacific coast. The committee likewise reported that the new notation had been adopted on the telegraph lines extending from England to Egypt, South Africa, India, China, Japan, Australia and New Zealand.

10. The committee reported at the annual meeting in January, 1887, the effect of the adoption of the 24-hour notation on the Canadian Pacific Railway. A large number of letters were submitted establishing the advantages of the new notation; these letters from superintendents, train dispatchers, conductors and others were embraced in a pamphlet of 49 pages, and showed that in the opinion of the writers the 24-hour notation can be introduced on any railway with ease, that its use is conducive to public safety, that it is of great advantage in operating railways, and that the general public accept the change with remarkable readiness.

11. At the annual meeting in January, 1888, the committee reported that the 24-hour notation had been adopted since the previous mid-summer on the Intercolonial Railway, extending from Quebec to Halifax, and that the managers of that line had placed at the service of the committee many letters respecting the new system, establishing beyond all question that wherever the 24-hour notation had been tried it had proved to be advantageous to railway service and to the public. The committee was likewise in a position to announce that Standard Time had been adopted throughout the Japanese Empire on January 1st, 1888.

12. At the summer convention held at Milwaukee in June, 1888, the committee reported further progress.

13. At the annual meeting in January, 1889, the committee reported the result of circulars sent out by the General Time Convention, along with a pamphlet on the 24-hour notation issued by the American Society of Civil Engineers. The committee likewise submitted important letters from the managers of the Canadian Pacific and Intercolonial railways, setting forth that the new notation had been thoroughly tested for two or three years on 3 657 miles of railway, that it had been introduced with ease, that the public readily accepted the change, that no objections to it had been heard in any quarter, that its extreme simplicity facilitated the movement of trains, and that the impossibility of errors resulting from its use promoted the safety of the public.

14. Further progress was reported at the convention held at Seabright

in June, 1889, and the society resolved to issue an additional 2 000 copies of the last annual report of the committee for general information. The report was issued in a pamphlet of 21 pages.

15. The committee reported at the annual meeting in January, 1890, that up to date, between five and six hundred prominent men had been heard from respecting the 24-hour notation, and of these an exceedingly small percentage were adverse to its early adoption. Among those in favor of its adoption were 123 presidents, vice-presidents and managers, 193 superintendents and traffic managers. The committee likewise reported that the time reform movement was attracting much attention in Europe.

16. At the annual meeting in January, 1891, the committee reported that railway men continued to be heard from, and that up to date a total number of 403 presidents, managers and others in the highest official positions (nearly all of whom had communicated directly with the Society) had expressed themselves in favor of the adoption of the 24-hour notation. As the aggregate length of railway with which these officers are connected is about 140 000 miles, it appears obvious that the proposal to adopt the 24-hour notation meets with general assent, that there is no insuperable obstacle in the way of its introduction throughout North America, and that the change may be effected at any time by joint arrangement among railway men.

The committee reported the adoption of the 24-hour notation throughout the Indian Empire and on the short railway mileage in China. Within the year 1890 the mileage of railway on which the new notation had been permanently introduced had increased from less than 4 000 miles to over 20 000 miles. The committee reported on the progress of the time reform movement in Europe, and referred to the official correspondence issued by the British Government to all the British colonies around the globe, recommending the principles of Standard Time and the new notation of the hours, which this Society has long advocated.

17. The committee has now to report that during the past year the advance of the movement has been most marked in Europe. For a number of years back the question has been under discussion among scientists, in the press, and from time to time in some of the legislatures of European nations. The most remarkable speech recorded is that of the late Count von Moltke in the Imperial German Parliament at the sitting of March 16th. This, perhaps the last public utterance of the illustrious and aged statesman-soldier, from the influence it has had in Europe and will continue to have throughout the world in extending the advantages of a movement in which this Society has taken a leading part, must be of interest to every member. A translation, somewhat abbreviated, is appended.

18. By the latest information from Europe it appears that the Belgian Minister of Railways, Posts and Telegraphs has issued a notice to all the

services connected with the departments, announcing that from May 1st, 1892, Standard Time will be used. He invites all the railway companies to adopt the same reckoning, and asks his colleagues in the Government to issue directions, for all services, to conform to the new reckoning in their relations with the public. The Government of Holland has likewise taken decisive action, and authorized the adoption of Standard Time based, as in Belgium, on the zone of the Greenwich meridian. This decision will come into force on May 1st, 1892, for the interior service, in Dutch territory. From the 1st of April next, Standard Time, based on the reckoning of the meridian 15 degrees east, will be introduced in the States of Bavaria, Wurtemberg, Baden, Alsace and Lorraine. Since October 1st, 1891, Austria Hungary has, by official authority, adopted Standard Time in all its public services. In Prussia there has been much discussion and much difficulty, owing to a reactionary movement, but a change followed the wise views expressed in the Reichstag by the late Field-Marshal von Moltke, and now it is by Imperial direction that the adoption of Standard Time is proposed. It is not unlikely, therefore, that the proposition will be finally resolved upon at the next sitting of the Chambers.

19. The strange opposition of France to the general introduction of Standard Time shows signs of weakening. It is true that France still isolates herself in this matter, as she did at the Washington conference, from all the other nations who voted for the meridian passing through Greenwich as the prime meridian to be common to all. But France has made some approach to uniformity by adopting the reckoning of Paris as the time for the whole nation. The reckoning of Paris differs from Standard Time only nine minutes, and it cannot be doubted that the good sense of the French people must eventually lead them to join their neighbors in a common system of uniformity by sacrificing the small difference of nine minutes, to general expediency.

20. From the latest information received, it is evident that Europe is now making the first great step in time reform which America made in 1883, in introducing Standard Time into general use. In the second important step, the adoption of the 24-hour notation, this country is somewhat anticipated by India, and we need not be greatly astonished to hear of a rapid development of the reform in Europe, when once the first step is fully taken. Already in the Belgiau parliament a prominent member, M. Houzeau de Lehaie, has moved the government to introduce the 24-hour notation.

21. It cannot but be a matter of congratulation to the American Society of Civil Engineers that this important movement for placing time reckoning on a proper scientific basis, makes progress in so many quarters. It is recognized that this Society has been one of the first and most active prime movers, that it has greatly stimulated the movement, not in this country alone, but throughout the globe. and it cannot be doubted

that the Society must eventually receive the fullest credit for the action which it has taken from the beginning.

22. In concluding this report the committee desires to express the great satisfaction which it has had in endeavoring to carry out the wishes of the Society as expressed in resolutions passed year by year. The members of the committee now place themselves at the disposal of the general meeting, thanking their fellow members of the Society very cordially for the confidence which has been reposed in them and so often renewed. If it be the wish of the Society to relieve them of their duties, they will accept discharge with the grateful feeling that they have been allowed to labor so long, and that their labors have been attended with some measure of success. Should the Society desire them to continue as a committee to watch every opportunity of further advancing the work with which they have been especially charged since 1881, they will willingly continue to serve as best they are able.

Respectfully submitted,

SANDFORD FLEMING, *Chairman*,
CHARLES PAINE,
THEODORE N. ELY,
T. M. TOUCEY,
T. EGLESTON.

SPEECH OF THE LATE FIELD MARSHAL COUNT VON MOLTKE, IN THE
IMPERIAL GERMAN REICHSTAG, SITTING MARCH 16TH, 1891.

(Referred to in the foregoing report.)

On the question of the imperial railway department, Count von Moltke said:

Gentlemen, allow me a few words on the subject which has been dealt with at an earlier session. I will not long detain you, as I am very hoarse, on which account I have to ask your indulgence.

That unity of time is indispensable for the satisfactory operating of railways is universally recognized, and is not disputed. But, gentlemen, we have in Germany five different units of time. In North Germany, including Saxony, we reckon by Berlin time; in Bavaria, by that of Munich; in Wurtemberg, by that of Stuttgart; in Baden, by that of Carlsruhe, and on the Rhine palatinate by that of Ludwigs-hafen. We have thus in Germany five zones, with all the drawbacks and disadvantages which result. These we have in our own fatherland, besides those we dread to meet at the French and Russian boundaries. This is, I may say, a ruin which has remained standing out of the once piecemeal condition of Germany, but which, since we have become an empire, it is proper should be done away with. (Very true.)

Gentlemen, it may seem to be of slight significance that the railway

traveler finds at each successive railway station a new notation of time which does not accord with his watch, but all these different times become a real difficulty of vital importance in carrying on the business of railways, especially for the services which, in a military point of view, must be demanded.

Gentlemen, in case of mobilization, all the time tables which apply to troops must be detailed in the time used in each locality. Naturally the troops and the inhabitants called out, can only judge by the time used at the place of their assembly and at their homes. Equally so the railway authorities sending out the time tables are similarly circumstanced.

As the north German authorities only reckon by Berlin time, all the arrangements and tables must be in Berlin time. This, repeated elsewhere, easily becomes the source of errors; errors which in their consequences may be very serious. There are circumstances of transport which may very much increase the difficulty, such as suddenly to change an arrangement, which a stoppage or an accident on the railway would, in a moment, render necessary. Gentlemen, it would be of great advantage if we could attain a common German unity of time; for this, above all others, is the reckoning by the 15th meridian east of Greenwich adapted. This meridian cuts through Norway, Sweden, Germany, Austria and Italy. By establishing the 15th meridian as a standard of reckoning, there will arise at the extreme eastern boundary a difference of thirty-one minutes, at the western of thirty-six minutes. Gentlemen, in south Germany less differences have been easily accepted into customary use, and in America they have much greater differences.

Gentlemen, unity of time merely for the railway does not set aside all the disadvantages which I have briefly mentioned; that will only be possible when we reach a unity of time reckoning for the whole of Germany, that is to say, when all local time is swept away.

Against this project all sorts of prejudices are now felt by the public, I think wrongfully. Certainly, after due consideration, the scientific men of your observatories have given their authority against the spirit of opposition.

Gentlemen, science desires much more than we do. She is not content with a German unity of time, or with that of middle Europe, but she is desirous of obtaining a world time, based upon the meridian of Greenwich, and certainly with full right from her standpoint, and with the end she has in view.

Now, the opinion has been expressed that the introduction of this common time into citizen life would cause confusion. The inconvenience it would cause to manufactories and to industry is especially brought forward. In this relation I must turn to the earlier amplifications of our colleague, Von Strumm. If the difference of time from the 15th degree to some other place is known, for example, to Neunkirchen

(perhaps twenty-nine minutes), it cannot be difficult to modify the regulations of the factory in accordance with it. If the manufacturer in March desires his men to begin at sunrise, so the regulations can establish twenty-nine minutes past six. If he requires them in February at ten minutes past six, so the regulations can name thirty-nine minutes past six, and so on.

How, then, will it affect the agricultural population? Indeed, gentlemen, the agricultural laborer does not pay much attention to the clock. For the most part he has none. He looks around to see if it is already light; then he knows that he will soon be called to work by the court bell. When the court clock goes wrong, which is generally the case (merriment)—when it is a quarter of an hour too fast, then, certainly, he comes a quarter of an hour before the proper time to work, but by the same clock he leaves a quarter of an hour earlier, the duration of work remains the same. Gentlemen, seldom in practical life is punctuality asked in respect to minutes. In many places it is customary for the school clock to be put back ten minutes, that the children may be present when the teacher arrives. Even the clock of the court of justice is often put back so that the parties can assemble before the proceedings commence. It is inverted in the villages which lie near the railways. The rule is to put the clock forward some minutes so that the folk do not lose the train. Indeed, gentlemen, this difference often becomes an academic quarter of an hour, and sometimes becomes somewhat longer. (Merriment.)

We have not yet adduced the difference between the time of the sun and mean time. Herr Von Strumm is perfectly right that this difference of time should be added to the already existing difference. But, gentlemen, we have to reckon both positively and negatively; in certain times the difference has to be added, in other times to be deducted. The climax of sixteen minutes is reached only four days in the year.

Gentlemen, has anybody amongst us who lives punctually by a well regulated clock ever remarked that he, in a fourth part of the year, has sat down to table sixteen minutes too early, or that he has retired too early to rest, and in the following fourth of the year too late? I think not.

Gentlemen, just the circumstance that this unimportant difference between solar time and mean time is not known to the great part of the public, nor felt by it, appears to me to prove that the apprehensions which are put forth on account of the discontinuance of local time are without ground.

Gentlemen, we are not able by a vote or by resolution to establish all that the movement aims to accomplish. Possibly this may be effected later through international negotiations. But I believe it will assist the movement if the parliament declares itself in sympathy with a principle, which, in America, in England, in Sweden, in Denmark and Switzerland, and in South Germany, has already obtained acceptance.

The report of the Imperial Railway Department was approved.

REPORT OF COMMITTEE ON IMPURITIES OF DOMESTIC
WATER SUPPLY.

To the American Society of Civil Engineers:

In the last report of this Committee hope was expressed that substantial progress could be made last year in enlisting the interest of those intrusted with the maintenance of the purity of public water supplies, toward the establishment of a self-supporting general organization, for the purpose of concentrating in the interest of all, the experience acquired and the results obtained by observers scattered over the area of the United States, under various conditions of climate and location. The results of the efforts recently made by a sister society on the same subject, although in a different direction, confirmed your Committee in the belief that by these means only can a useful end be attained.

As we stated before, this task may not result in success, but we remain of opinion that the importance of the question and the encouragement received from various quarters justifies further action. Circulars are now being prepared for the purpose of obtaining the views, and, if possible, the acquiescence of those mostly interested.

Consequently, although only able to report progress, we respectfully ask that your Committee be continued.

Respectfully submitted.

A. FTELEY, *Chairman.*

REPORT OF COMMITTEE ON UNIFORM METHODS OF TEST-
ING MATERIALS USED IN METALLIC STRUCTURES, AND
ON THE REQUIREMENTS FOR THESE MATERIALS TO
FURTHER IMPROVE THE GRADE OF SUCH STRUCTURES.

To the American Society of Civil Engineers:

Your Committee on Uniform Methods of Testing Materials used in Metallic Structures, etc., respectfully begs leave to submit the following preliminary progress report :

The Committee held its first meeting, with a full attendance, at Cresson, Pa., during the Annual Convention of 1890, and organized by the election of G. Bousearen as Chairman, and James G. Dagon as Secretary. At this meeting it was determined that the Committee should, for the present, consider the question of uniform methods of testing materials used in metallic structures, confining its investigations to tests of cast and wrought iron, steel and steel castings; the question of the requirements that these materials should comply with, when used in metallic structures, was laid aside for future consideration, to be taken up when uniform methods of testing such materials had been determined on.

The Secretary was instructed to prepare a circular letter, to be sent

to engineers and others interested in the work of the Committee, embodying such questions with reference to the testing of materials used in metallic structures as might prove a guide to the Committee in its further investigations of the subject, and enable them, by a discussion of the answers received, to find a common ground upon which a scheme of uniform methods of testing these materials might be based. In accordance with these instructions, the circular was prepared, and sent out to engineers known to be interested in its subject matter, to prominent iron and steel manufacturers and to prominent bridge building companies. This circular is reproduced below:

AMERICAN SOCIETY OF CIVIL ENGINEERS.

COMMITTEE ON UNIFORM METHODS OF TESTING MATERIAL USED IN METALLIC STRUCTURES, ETC.

Circular No. 1.

CAST IRON.

1. Please state if each of the following tests should be made in current testing:

- a. Transverse,.....
 - b. Tensile, for ultimate strength only,.....
- (Write *Yes* or *No*.)

2. Please state what, in your opinion, would be the proper shape and dimensions of specimens to be used in making the above tests, and how these specimens should be cast or prepared,.....

WROUGHT IRON.

1. Shall the following properties be determined in making specimen tests?

- a. Elastic Limit,.....
 - b. Ultimate Strength,.....
 - c. Per cent. of Elongation, in gauged length,.....
 - d. Reduction of Area,.....
- (Write *Yes* or *No*.)

2. Shall the load, in making specimen tests, be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the elastic limit should be determined.

3. Please state what, in your opinion, should be the proper gauged length in which to measure the elongation, and should this measurement include the space of sudden contraction?

4. Shall each of the following tests be made? If so, in what manner?

- a. Bending Test,.....
 - b. Fracture Test,.....
- (Write *Yes* or *No*.)

5. Please state what, in your opinion, would be the proper shape and dimensions of the specimens to be used in making the above tests, and how the specimens should be prepared.

.....

STEEL.

1. Shall the following properties be determined in making specimen tests?

- a. Elastic Limit,.....
 - b. Ultimate Strength,
 - c. Per cent. of Elongation, in gauged length,.....
 - d. Reduction of Area,.....
- (Write Yes or No.)

2. Shall the load, in making specimen tests, be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the Elastic Limit should be determined.

.....

3. Please state what, in your opinion, should be the proper gauged length in which to measure the elongation, and should this measurement include the space of sudden contraction?

.....

4. Shall each of the following tests be made? If so, in what manner?

- a. Bending Test,.....
 - b. Fracture Test,.....
 - c. Quenching Test,.....
 - d. Drifting Test,.....
 - e. Annealing Test,.....
- (Write Yes or No.)
-

5. Please state what, in your opinion, should be the proper shape and dimensions of the specimens to be used in making the different tests above specified,

.....

CAST STEEL.

Please state what tests, in your opinion, should be made for steel castings to be used for structural purposes,.....

.....

TESTS OF FULL SIZE MEMBERS IN IRON OR STEEL.

1. Shall each of the following properties be determined in making tests of full size members of iron or steel?

- a. Elastic Limit,.....
 - b. Ultimate, Tensile or Compressive, Strength,.....
 - c. Per cent. of Elongation or Compression, in gauged length,
 - d. Reduction of Area, in Tensile tests,.....
- (Write Yes or No.)

2. Shall the load, in making tests of full size members, be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the Elastic Limit should be determined?

.....

Please state what proportion, in your opinion, there should be between the number of specimen and full size tests to be made, and the quantity of material to be delivered.....

Date,.....1891.

Signature,.....

Title,.....

Address,.....

Answers to the circular have been received from the following:

- J. N. Barr, Supt. M. P., C. M. & St. P. Ry., Milwaukee, Wis.
 Onward Bates, Engr. and Supt. Bridges and Buildings, C. M. & St. P. Ry., Chicago, Ill.
 Max J. Becker, Chief Engineer P. C. C. & St. Louis R. R., Pittsburgh, Pa.
 Alfred P. Boller, Consulting Engineer, New York.
 G. H. Blakeley, Chief Engineer Passaic Rolling Mills, Paterson, N. J.
 C. E. Buzby, M. E., Supt. of Riehle Bros., Philadelphia, Pa.
 H. H. Campbell, Asst. Supt. Penna. Steel Co., Steelton, Pa.
 Thos. C. Clarke, Consulting Engineer, New York.
 Theo. N. Ely, Genl. Supt. M. P., Penna. R. R., Altoona, Pa.
 Chas. E. Emery, Consulting Engineer, New York.
 Jno. A. Fulton, Bridge Engineer, L. S. & M. S. Ry., Cleveland, Ohio.
 Geo. Gibbs, Mechanical Engineer, C. M. & St. P. Ry., Milwaukee, Wis.
 W. H. Hipple, Insp. Bridge Materials, Penna. R. R., Philadelphia, Pa.
 J. B. Johnson, Prof. Civil Engineering, Washington University, St. Louis, Mo.
 Stewart Johnston, Supt. Pittsburgh Steel Casting Co., Pittsburgh, Pa.
 Wm. Kent, M. E., Consulting Engineer, New York.
 Wm. Metcalf, Crescent Steel Works, Pittsburgh, Pa.
 R. Montfort, Chief Engineer, L. & N. R. R. Co., Louisville, Ky.
 Tinius Olsen & Co., Mfrs. of Testing Machines, Philadelphia, Pa.
 Chas. Pettigrew, Supt. Illinois Steel Co., Joliet, Ill.
 H. A. Porterfield, Engr. of Tests, Carnegie Bros. & Co., Limited, Pittsburgh, Pa.
 L. S. Randolph, Engr. of Tests, B. & O. R. R., Baltimore, Md.
 Palmer C. Ricketts, Prof. of Mechanics, Rens. Poly. Inst., Troy, N. Y.
 San Francisco Bridge Co., San Francisco, Cal.
 Chas. F. Stowell, Bridge Engineer, N. Y. R. R. Commission, Albany, N. Y.
 C. L. Strobel, Consulting Engineer, Chicago, Ill.

S. T. Wellman, Pres't Wellman Iron and Steel Co., Thurlow, Pa.
 Albert D. Wilkins, Eng'r of Tests, Spang Steel and Iron Co., Ltd.,
 Pittsburgh, Pa.

Which answers represent but a small percentage of the total number of circulars sent out.

The answers to the questions propounded in the circular have been summarized as far as possible, and the following is such summary:

(Summary of Answers to Circular No. 1.)

CAST IRON.

1. Please state if each of the following tests should be made in current testing:

- a. Transverse—

Yes.....18 No..... 1

- b. Tensile, for ultimate strength only—

Yes..... 9 No..... 9

2. Please state what, in your opinion, would be the proper shape and dimensions of specimens to be used in making the above tests, and how these specimens should be cast or prepared.

The answers to this question presenting no uniformity, the following is, as far as practicable, a condensed statement of the opinions advanced:

For transverse tests—

- a. Shape of test specimen:

Favor a test specimen 1 inch square..... 12

“ “ 1¼ “ 2

“ “ 1½ “ 3

“ “ 2 “ 4

- b. Length between bearings:

Favor a distance of 12 inches..... 6

“ “ 18 “ 1

“ “ 24 “ 3

“ “ 30 “ 1

“ “ 36 “ 1

“ “ 48 “ 1

“ “ 54 “ 1

For tensile tests—

In favor of bar 1 inch square, turned to ¾ inch diam.,
 10 to 12 inches long 1

In favor of bar 1 inch round, turned to ¾ inch diam., for
 6 inches, 14 inches long..... 1

In favor of bar 1¼ or 1½ inch square, turned to 1½ inch
 diam., 6 inches between shoulders..... 1

In favor of bar 2 inches square, turned to ¾ inch diam.,
 12 inches long 1

- In favor of bar $\frac{7}{8}$ inch to $1\frac{1}{4}$ inch square, 20 inches long, no machine preparation..... 1
- In favor of specimen prepared as per sketches (1), (2), (3), each..... 1

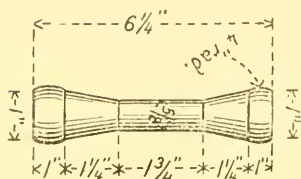


FIG. 1.

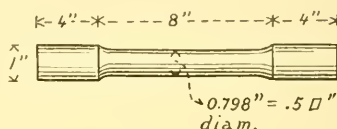


FIG. 2.

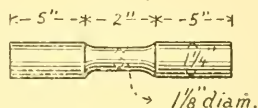


FIG. 3

WROUGHT IRON:

1. Shall the following properties be determined, in making specimen tests?

a. Elastic Limit—

Yes..... 19 No..... 2

b. Ultimate Strength—

Yes..... 21 No..... 0

c. Per cent. of Elongation, in gauged length—

Yes 21 No..... 0

d. Reduction of Area—

Yes..... 8 No..... 11

2. Shall the load, in making specimen tests, be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the Elastic Limit should be determined.

a. Application of load:

In favor of applying load continuously..... 19

“ “ “ intermittently..... 2

b. Time to be consumed in applying load:

Think rate of speed immaterial, within ordinary limits of practice..... 2

Favor rate of speed such as will give an elongation of 1 inch, various definite periods of time 5

c. Determination of Elastic Limit:

In favor of an autographic record 6

In favor of use of instruments of precision, indicating the elongation..... 6

In favor of determining E. L. by drop of beam..... 5

3. Please state what, in your opinion, should be the proper gauge

length in which to measure the elongation, and should this measurement include the space of sudden contraction?

- a. Favor measuring elongation on a length of 8 inches.. 16
 Favor measuring elongation on a length of
 (8 diam. + 2 inches)..... 1
 Favor measuring elongation on a length of 10 diam.
 (not less than 5 inches)..... 1
 Favor measuring elongation on a length of 6 inches.. 1
- b. In favor of including space of sudden contraction... 17
 In favor of not " " " " " " ... 2
4. Shall each of the following tests be made? If so, in what manner?
- a. Bending Test—
 Yes..... 20 No..... 1
- b. Fracture Test—
 Yes..... 13 No..... 5
 Yes (for tension iron only) 1
- a. Bending Test:
 In favor of making this test by hammering..... 4
 In favor of making this test by bending specimens
 around a stud..... 5
 In favor of making this test by bending specimens under
 a hydraulic press..... 1
- b. Fracture Test:
 Favor making this test by nicking specimen..... 8

5. Please state what, in your opinion, would be the proper shape and dimensions of the specimens to be used in making the above tests, and how the specimens should be prepared.

The answers to this question presenting no uniformity, such opinions as can be abstracted are presented below:

Specimens to be square or rectangular, area to be not less than 0.5 square inches, length of specimens 12 to 16 inches.....	1
Specimens to be square or round, 16 to 20 inches long.	1
Area of specimens to be not less than 1 square inch....	1
Area of specimens to be as large as practicable, length of turned down part at least 12 diameters, and not less than 8 inches	1
Area of specimens to be at least 0.5 square inches, 18 inches long.....	1
Area of specimens to be 0.75 square inches, 10 inches long.....	1
Area of specimens to be 0.5 square inches, 12 inches long.....	1
Specimens to be full size, as far as possible.....	6

STEEL:

1. Shall the following properties be determined in making specimen tests?

a. Elastic Limit:

Yes..... 17 No..... 4

b. Ultimate Strength:

Yes..... 21 No..... 0

c. Per cent. of elongation in Gauged Length:

Yes..... 21 No..... 0

d. Reduction of Area:

Yes..... 9 No..... 9 Not important..... 2

2. Shall the load in making specimen tests be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the elastic limit should be determined?

a. Application of Load:

In favor of applying load continuously..... 19

In favor of applying load intermittently..... 2

b. Determination of Elastic Limit:

In favor of an autographic record..... 2

In favor of use of instruments of precision, indicating the elongations..... 6

In favor of determining by drop of beam..... 4

3. Please state what, in your opinion, should be the proper gauged length in which to measure the elongation, and should this measurement include the space of sudden contraction?

a. Favor measuring elongation on a length of 8 inches... 17

Favor measuring elongation on a length of (8 diameters + 2 inches)..... 1

Favor measuring elongations on a length of 10 diameters (not less than 5 inches)..... 1

Favor measuring elongations on a length of 6 inches.. 1

b. In favor of including space of sudden contraction.... 17

In favor of not including space of sudden contraction. 1

4. Shall each of the following tests be made? If so, in what manner?

a. Bending Test:

Yes..... 21 No..... 0

b. Fracture Test:

Yes..... 11 No..... 6 Optional..... 2

c. Quenching Test:

Yes..... 11 No..... 6 Optional..... 2

d. Drifting Test:

Yes..... 13 No..... 5 Optional..... 1

e. Annealing Test:

Yes..... 4 No..... 10 Optional..... 2

5. Please state what, in your opinion, should be the proper shape and dimensions of the specimens to be used in making the different tests above specified.

The answers to this question presenting no uniformity, such opinions as can be abstracted are presented below:

Specimen tests to be $\frac{3}{4}$ inch in diameter. Bending fracture and quenching tests to be made on square or rectangular specimens, not less than 1 square inch area, drifting test in flats and angles to be made on full size pieces. Bending, fracture, quenching and drifting tests to be made on finished material.....	1
Specimen tests to be made on $\frac{3}{4}$ -inch round bar of a length not less than 12 diameters between jaws of testing machine, and to be taken from three separate ingots of each cast. Tests of finished material to be made on square or round test pieces 12 inches long, not less than 0.5 square inches in area	1
Tensile tests to be made in full size sections if possible, pieces from all material, but rounds, to be rectangular, two sides to be planed, and corners filed off, the other two sides to be as rolled if practicable; rounds not over 3 inches in diameter to be turned down, larger sized rounds to have pieces slotted from surface and turned down.....	1
Specimens to be square or rectangular, area not less than 0.5 square inch, 12 to 16 inches long.....	1
Area of specimens to be as large as practicable, length of turned down part at least 12 diameters, and not less than 8 inches.....	1
Specimens to be full size, as far as possible.....	3

CAST STEEL.

Please state what tests, in your opinion, should be made for steel castings to be used for structural purposes.

The answers to this question which can be abstracted are presented below:

Tests should be made according to nature of their use, should be treated about as wrought iron tests.....	1
Determine tensile and transverse strength, and make bending test.....	3
Make the same tests as for cast iron.....	1
Test, in tension, determine elastic limit, ultimate strength and elongation.....	2
Cast three ingots per heat (ingots to be 2 inches square or more), turn down to $\frac{3}{4}$ inch diameter, and test in tension	1

Test bars cast in same kind of mould as original casting.....	1
Test same as wrought iron and steel for tension and bending, but cast the specimens as a thick coupon attached to the thickest part of the main casting, to betray blow holes and flaws when machined....	1
Should be free from blow holes, honeycomb and other defects	1
Should be tough, low in silicon and carbon. Blow holes indicate tough mild castings. Perfectly sound castings are likely to be high in silicon or carbon, or both, and then if not annealed carefully and thoroughly are liable to break.....	1

TESTS OF FULL SIZE MEMBERS IN IRON OR STEEL.

1. Shall each of the following properties be determined in making tests of full size members of iron or steel?

a. Elastic Limit:

Yes..... 17 Yes (iron only)..... 1 No.... 0

b. Ultimate, Tensile or Compressive, Strength:

Yes.. 16 Yes (tensile strength only).. 2 No.. 0

c. Per cent. of Elongation or Compression in gauged length:

Yes..... 18 No..... 0

d. Reduction of Area in Tensile Tests:

Yes..... 8 No (steel only)..... 1 No..... 8

2. Shall the load, in making tests of full size members, be applied continuously or intermittently, and how much time should be consumed in applying it? Please state how the elastic limit should be determined.

a. Application of Load:

In favor of applying load continuously..... 12

In favor of applying load intermittently..... 4

In favor of applying load as nearly as possible as in actual use

2

b. Determination of Elastic Limit:

In favor of an autographic record..... 7

In favor of using instruments of precision..... 3

In favor of determining by drop of beam..... 2

The question of uniform methods of testing materials is the subject of much attention, both in this country and in Europe, at the present time, and committees appointed by the Am. Soc. M. E., in this country, and others in France and Germany, are devoting their energies to its investigation. It is desirable that the work of these various committees should tend to an agreement upon the principal points at issue, so that

practically uniform methods of testing can be internationally adopted.

In submitting this preliminary report your committee trusts that it will be discussed by the members of the Society and others interested in its subject matter, and respectfully asks to be continued.

For the Committee,

JAMES G. DAGRON,
Secretary.

January 20th, 1892.

MEMOIRS OF DECEASED MEMBERS.

GEORGE CODWISE DICKINSON, M. Am. Soc. C. E.

George Codwise Dickinson, Member of the American Society of Civil Engineers (1890), was born in the City of New York, December 2d, 1832.

After leaving school in 1848, at the early age of sixteen, he began the study and practice of civil engineering with James G. Serrell, at that time City Surveyor of New York. In 1851 he was employed as rodman and draughtsman in the construction of the Hudson River Railroad, but after a year's service returned to the office of Stuart, Serrell & Burnett and engaged in city work. He was employed during 1852 and 1853 in making surveys for the Williamsburg (Long Island) Water Works. In 1854 he removed to Richmond, Va., and became office assistant and draftsman on the Richmond and York River Railroad.

At the commencement of the civil war in 1861 he was commissioned in the engineer service of the State of Virginia, and assigned to duty in the forts at Gloucester Point, on York River. In 1862 he entered the service of the Confederate States, and for some time was engaged as Division Engineer in the surveys and construction of the Piedmont Railroad in Virginia and North Carolina. From May, 1863, until the close of the war he was on duty as Captain of Engineers with the Army of Northern Virginia.

After several years of service on the Chesapeake and Ohio, the Elizabethtown, Lexington and Big Sandy, and the Baltimore Short Line Railroads, he was appointed City Engineer of Portsmouth, Ohio, and remained in this position until 1879, when he engaged in the private practice of his profession.

In 1881-82 he was in charge of the survey and construction of a part of the Ohio Central Railroad along the Great Kanawha River, in West Virginia. From 1883 to 1888 he was in the service of the Baltimore and

Ohio Railroad at Philadelphia, as draughtsman of mechanical structures, and in charge of the construction of the wharf and ferry slip at the terminal at Canton, and in laying the foundation of the depot and train sheds at Philadelphia. In 1888 Mr. Dickinson was appointed Assistant Engineer of the Hudson Suspension Bridge and New England Railway, and was given charge of the construction of the masonry for the towers and anchor pits of the Peekskill Suspension Bridge over the Hudson, at Anthony's Nose. At this time he made a report on the cements in use in the United States, which was highly spoken of by other engineers. This work here was his last important engineering service.

In all the various lines of his profession in which Mr. Dickinson was engaged, he took a genuine delight and gave his undivided attention. He was exceedingly methodical and accurate, careful, a close reasoner, and honest in all his work, and his results could always be relied upon. His early habits of study continued through his business life, and he devoted many hours of each day before the active discharge of his duties to preparation for them and to quiet study.

He was devoted to his family, his final sickness resulting from the fatigue consequent upon watching at his only daughter's bedside, and from grief at her death, which occurred a week before his own.

He became a member of the Am. Soc. C. E. February 5th, 1890, and died at his residence, Rougemont, Albemarle Co., Va.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
DEEN, JAMES WORK.....	Division Engineer Denver and Rio Grande R. R., Salida, Colo.....	Jan. 6, 1892
FAIRLEIGH, JAMES ANDREW.....	11 Richardson Block, Chattanooga, Tenn.....	Sept. 2, 1891
NORTHRUP, HERBERT FRANKLIN...	Division Engineer Chicago and West. Michigan Ry.. Traverse City, Mich.....	Jan. 6, 1892

ASSOCIATE MEMBERS.

COCKROFT, CHARLES ALLEN.....	92 Metropolitan avenue, Brooklyn, N. Y.....	Jan. 6, 1892
COLE, HOWARD JUDSON.....	71 Broadway, New York City	Jan. 6, 1892
DUNN, EMMETT CLARKE.....	Engineer Maintenance of Way, Virginia Midland Division Richmond and Danville R. R., Alexandria, Va.....	Nov. 4, 1891

ROSENBERG, FRIEDRICH.....	General Manager Bessemer Ditch Co., and Engineer Colorado Coal and Iron Co., Pueblo, Colo.....	J. Oct. 2, 1889 Associate M., Jan. 6, 1892
SMITH, ALBERT.....	Washington, Pa.....	Jan. 6, 1892

JUNIORS.

BAUM, GEORGE.....	Brooklyn Elevated R. R., 31 Sands st., Brooklyn, N. Y.....	Jan. 4, 1892
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CHANGES AND CORRECTIONS.

MEMBERS.

BAILEY, GEORGE I.....	95 Eagle st., Albany, N. Y.	
BERRIAN, R. M.....	255 West 128th st., New York City.	
BISSELL, FRANK E.....	South Bend, Ind.	
BRADLEY, WILLIAM H.....	642 Exchange, Boston, Mass.	
DAVIS, CHARLES E. L. B.....	Major, Corps of Engineers, U. S. A., 601 18th st. N. W., Washington, D. C.	
DOANE, EDWIN A.....	Consulting Engineer and Real Estate Broker, 27½ Whitehall st., Atlanta, Ga.	
EMERY, CHARLES E.....	Bennett Bldg., New York City.	
FELTON, SAMUEL M.....	President East Tenn., Va. and Georgia Ry., and C. N. O. and T. P. Ry., St. Paul Bldg., Cincinnati, Ohio.	
FRITH, ARTHUR J.....	21 East 46th st., New York City.	
GILLHAM, ROBERT.....	Rialto Bldg., Kansas City, Mo.	
GRANT, E. W.....	Box 133, East Las Vegas, N. M.	
GRANT, WILLIAM H.....	122 West 88th st., New York City.	
HEGEMAN, W. W.....	50 Broadway, New York City.	
HENRY, D. C.....	Engineer Excelsior Redwood Co., Fourth and Channel sts., San Francisco, Cal.	
JACKSON, J. M.....	Schenectady, N. Y.	
JOHNSTON, H. G.....	Salina, Kans.	
KASTL, ALEXANDER E.....	U. S. Engineers' Office, Vicksburg, Miss.	
KILLEBREW, SAMUEL.....	Chief Engineer Northern Div. M. P. Ry., Acayucan, Vera Cruz, Mexico.	
KITTREDGE, GEORGE W.....	Chief Engineer C. C. C. and St. L. Ry., Cincinnati, Ohio.	
LE CONTE, LOUIS J.....	P. O. Box 492, Oakland, Cal.	
LEWIS, EVERETT W.....	Assistant Engineer, City Engineer's office, Duluth, Minn.	
LOW, EMILE.....	Engineer in charge Coal Operations, Ohio Extension N. and W. R. R., Kenova, W. Va.	
MERRIMAN, MANSFIELD.....	South Bethlehem, Pa.	
MILLER, J. IMBRIE.....	Bryn Mawr, Pa.	

MILLS, CHARLES M.....	Assistant Engineer Ohio Extension N. and W. R. R., Kenova, W. Va.
MORTON, JOHN H.....	(Care E. J. Yard, Res. Eng. R. G. W. Ry.), Salt Lake City, Utah.
MOSMAN, A. T.....	Commissioner International Boundary Commis- sion U. S. and Mexico, El Paso, Texas.
PARSONS, W. BARCLAY.....	22 William st., New York City.
PICKETT, WILLIAM D.....	Colton, Cal.
PLAYLE, EDWARD F.....	Manhattan Club, New York City.
READ, ROBERT L.....	64 West 3d st., Cincinnati, Ohio.
RICHARDSON, THOMAS F.....	424½ Jackson Boulevard, Chicago, Ill.
ROBINSON, A. F.....	910 Monroe st., Topeka, Kansas.
ROOD, HENRY M.....	373 Monroe st., Chicago, Ill.
ROWE, R. D.....	332 Webster ave., Chicago, Ill.
SHIRREFFS, REUBEN.....	Westmoreland Club, Richmond, Va.
STEVENS, HORACE E.....	P. O. Box 2396, St. Paul, Minn.
STEWART, JOHN M.....	309 West 54th st., New York City.
THOMPSON, GAYLORD.....	Principal Assistant Engineer Otis Elevating Ry., Palenville, N. Y.
THOMPSON, SAMUEL C.....	2622 Third ave., New York City.
WHISTLER, THOMAS D.....	2 West Biddle st., Baltimore, Md.
WRIGHT, GEORGE F.....	Consulting Engineer, Abstract Bldg., Los An- geles, Cal.

ASSOCIATE MEMBERS.

GARDNER, MARTIN L.....	80 Fourth ave., Newark, N. J.
THOMPSON, T. KENNARD.....	(Care C. M. Jacobs), 192 Broadway, New York City.
VON GEMMINGEN, S.....	Assistant Engineer C. and O. Ry., Newport News, Va.

ASSOCIATE.

GOODELL, JOHN M.....	9 West 21st st., New York City.
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JUNIORS.

ABBOTT, EDWARD L.....	121 La Salle st., Room 33, Chicago, Ill.
DURYEA, EDWIN, JR.....	Craigsville, Orange Co., N. Y.
LAWLOR, FRANK D. H.....	St. Johns, N. B., Canada.
LAWTON, F. B.....	(Care Shepherd & Searing), 69 Arapahoe Bldg., Denver, Colo.
McFARLAND, B. W.....	711 Emerson ave., Syracuse, N. Y.
PURSLOW, E. J.....	Engineer in charge Camp 1, Arrowhead Reser- voir Co., San Bernardino, Cal.
SMITH, PEMBERTON.....	Trainmaster N. Y. C. and H. R. R. R., Albany, N. Y.
TREADWELL, LEE.....	Keith & Perry Bldg., Kansas City, Mo.
TYRRELL, HENRY G.....	Phoenix Iron Co., Phoenixville, Pa.
WHEATLY, ARTHUR C.....	Mexican Pacific Ry., Acayucan, Vera Cruz, Mexico.

ADDITIONS TO LIBRARY AND MUSEUM.

- From American Society of Mechanical Engineers, N. Y.:
Transactions, Vol. XII, 1891.
- From Architectural League, N. Y.:
Constitution, By-Laws, Officers, etc.
- From Austrian Society of Engineers and Architects, Vienna, Aus.:
Schäden an Dampfkesseln.
- From Baltimore and Ohio Railroad Co.:
Specifications for Workmanship and Quality of Material for Wrought Iron and Steel Bridges.
- From Captain I. M. Carter, Corps Engineers, U. S. A.:
Annual Report upon the Improvement of Certain Rivers and Harbors in Georgia, and of Cumberland Sound, Ga. and Fla.
- From Hon. William E. Curtis, Washington, D. C.:
International American Conference, Reports of Committees and Discussions Thereon. Vol. I to IV, inclusive.
Bureau of the American Republics Bulletins. Nos. 2 to 15, inclusive; 18 to 21, inclusive; 24 to 29, inclusive.
Report relative to an International Railway Line.
- From Prof. James E. Denton, Stevens Institute, Hoboken, N. J.:
Experiments and Researches on Trap Siphonage, showing the Comparative Merits of the Principal Appliances used for Trap-seal Protection.
- From Pat Doyle, C. E., Calcutta, India:
Junctions and Connections for Lines of Railway.
- From J. N. Du Barry, Vice-Prest. Penn. R. R. Co.:
Annual Reports of the Pennsylvania R. R. Co., 2d, 6th, 7th, 10th, 11th, 12th, 14th, 15th, 17th, 22d, 29th and 32d to 44th, inclusive.
- From J. H. Ellis, Secy., Louisville, Ky.:
Thirty-sixth to 40th Annual Reports of the Louisville and Nashville R. R. Co.:
- From Lewis M. Haupt, C. E., University of Pennsylvania:
The Commercial Paradox.
- From John N. Hill, Cons. Eng., Cincinnati, Ohio:
New Water Works for Cincinnati.
- From Institute of Civil Engineers, London, Eng.:
List of Members. 2d Jan., 1892.
Los Angeles Cable Railways.
Four-screw Hopper Dredger.
Queensland Water Supply.
Electric Lighting at Tamworth, N. S. W.
Practical Astronomy as applied to Land Surveying.
- From Institution of Mechanical Engineers, London:
Proceedings, 1891.
- From William Jackson, City Eng., Boston, Mass.:
Framed Photograph of the Harvard Bridge.
Contracts and Specifications for the City of Boston. Nos. 129 to 148, inc. 1891.
- From William H. Jaques, Ord. Eng., South Bethlehem, Pa.:
Heavy Ordinance for National Defense.
Modern Armor for National Defense.
Ericsson's Destroyer and Submarine Gun.
Torpedoes, Torpedo Vessels and Torpedo Warfare.
Report of the Gun Foundry Board, 1884.
Trial of 11½-inch All Steel Armor Plate.
Internal Stresses in Steel.
Bethlehem Armor and Recent Armor Experiments at the Naval Ordnance Proving Ground, Annapolis, Md.
- From Manchester Ship Canal Co., Manchester, Eng.:
District Map showing Canals and Navigations connecting with Manchester.
Map of Manchester Ship Canal.
General Plan of Manchester Ship Canal.
British Association, 1886. Canals.
Report of Consul Hale, 1888.
Manchester Ship Canal. Directors' Report. April and November, 1891.
4th International Congress on Inland Navigation. Manchester Ship Canal.
The Commercial Aspects of the Manchester Ship Canal.
- From Robert Moore, C. E., St. Louis, Mo.:
Two framed Photographs of the St. Louis Elevated R. R.
- From J. F. Maxwell, State Engineer, Denver, Col.:
5th Biennial Report of the State Engineer to the Governor of Colorado, 1889-90.
- From W. P. Mason:
Notes on Some Cases of Drinking Water and Disease.
- From Ladislav Netto, Rio de Janeiro, through the Smithsonian Institution:
Le Museum National de Rio de Janeiro et sur influence sur les sciences naturelles au Bresil.
- From George S. Rice, Chief Engineer Rapid Transit Com., Boston, Mass.:
Report on the Transportation of Passengers in and around the cities of Europe, by Osborne Howes.
Report on the Transportation of Passengers in and around the cities of Europe, by John E. Fitzgerald.
- From John A. Russell, San Francisco, Cal.:
Municipal Reports of San Francisco, 1891.
- From Major A. P. Sears, C. E., Portland, Ore.:
Reclamation of the Arid Lands of the Valley of Piura, Peru.

- From Hamilton Smith, Jr., London:
Map of the Central London Railway Co.,
with Prospectus of the Exploration
Company.
- From U. S. Department of State:
Special Consular Reports. Coal and Coal
Consumption in Spanish America.
Canals and Irrigation in Foreign
Countries.
- From U. S. Bureau of Education:
Report of the Commissioner of Educa-
tion, 1888-89.
- From U. S. Engineer Department. Chief of
Engineers' Quarterly Statement of Stations
of Officers, Proposals and Specifications, as
follows:
For Dredging in Boston Harbor.
For Removing Wrecks in Darien Harbor,
Ga.; schooner *Mary E. Oliver*, in Vine-
yard Haven Harbor, Mass.; schooner
Pythou, near Bell Buoy, in Pollock Rip,
Mass.; in Townsend Inlet Bar, N. J.;
schooner *Harvey N. Anderson*, off Hog
Island, Va.
For Delivering Clay for Improving St.
Mary's Falls Canal.
For Rock and Brush for Improving
Mississippi River.
For Construction of Pile Wharf at Yerba
Buena Island, Cal.
- For Furnishing Electric Light for U. S.
tow-boat *Coal Bluff*, at Quincy, Ill.
For Building a Revetment along the high
water line of Mount Pleasant.
For Broken Stone at Fort Warren, Mass.
- From U. S. Geological Survey:
Twenty-four Maps of the U. S. Geological
Survey.
- From U. S. Interior Department:
Annual Report of the Commissioner of
Patents, 1890.
- From University of the State of New York:
State Library Bulletin Legislation No. 2.
University Extension Bulletin No. 1.
- From Otto von Geldern, C. E., San Francisco,
Cal.:
Notes on the Dry Dock and Cofferdam
at the Navy Yard, Mare Island, Cal.
- From J. Elfreth Watkins, C. E., Washington,
D. C.:
The Development of the American Rail
and Track, as illustrated by the collec-
tion in the U. S. National Museum.
- From Hon. Edward Wemple, Albany, N. Y.:
Annual Report of the Comptroller of the
State of New York, 1892.
- From World's Columbian Exposition, Chi-
cago:
World's Fair Notes.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—February, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

FEBRUARY 3D, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected: As Members: J. Rivers Carter, Lincoln, Ala.; Charles Arthur Hague, New York City; Knud Sophus Riser, Clinton, Iowa; Arthur Wells Robinson, Bucyrus, Ohio; William Henry Giles Temple, Providence, R. I.; Anthony Victorin, West Troy, N. Y.; Jonathan Wainwright, Pittsburgh, Pa.; John Cassan Wait, Cambridge, Mass. As Associate Members: Samuel Eben Barney, Jr. (elected Junior, June 2d, 1886), New Haven, Conn.; Edward Hanson Connor (elected Junior, February 5th, 1890), New York City; Allan Darst Conover (elected Junior, June 4th, 1884), Madison, Wis.; William Bion Ewing (elected Junior, April 3d, 1889), Charles Alfred Hasbrouck (elected Junior, March 7th, 1887), Chicago, Ill.; George Allen Kyle, Olympia, Wash.; Paul Voorhees, Buffalo, N. Y.

The death of E. P. Butts, Jun. Am. Soc. C. E., on January 11th, 1892; George C. Dickinson, M. Am. Soc. C. E., on January 24th, 1892, and the death of Arthur Owen Wilson, M. Am. Soc. C. E., on December 20th, 1891, were announced by the Secretary.

A paper by Frank A. Calkins, M. Am. Soc. C. E., on "Brick Manufacture and Brick Pavement," was read, and discussed by Messrs. A. F. Sears, Calvin Tomkins, S. Whinery, T. C. Clarke, Edward P. North, S. C. Thompson and F. Collingwood.

FEBRUARY 17TH, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary.

The death of Edward M. Reed, M. Am. Soc. C. E., on February 13th, 1892, was announced by the Secretary.

A paper by William Starling, M. Am. Soc. C. E., on "Some Notes on the Holland Dikes," was read by the Secretary, and discussed by General C. B. Comstock, Messrs. Desmond FitzGerald, Alfred F. Sears and F. Collingwood.

OF THE BOARD OF DIRECTION.

FEBRUARY 2D, 1892.—The time and place for the Annual Convention were considered. The preliminary address of the General Committee of the World's Congress Auxiliary, and Executive Committee Circular No. 2, World's Columbian Exposition, were considered and a committee appointed. The appointment of an alternate delegate to fill the vacancy caused by the death of Colonel William E. Merrill was considered. Appropriations for the First Quarter of 1892 were made and approved. Discussion was had on the business methods of the Society and future requirements. Applications were considered.

The following were elected:

As Associates—Cassius Howard Lindenberger, Detroit, Michigan.
As Juniors—Cyrus Cates Babb, Washington, D. C.; Frank Wilmarth Kinsey, Newark, N. J.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.		Date of Election.	
CARTER, J. RIVERS.....	Alabama Club, Birmingham, Ala.....	Feb.	3, 1892
HAGUE, CHARLES ARTHUR.....	86 Liberty st., New York City	Feb.	3, 1892
RISER, KNUD SOPHUS.....	415 Third st., Clinton, Iowa.	Feb.	3, 1892
ROBINSON, ARTHUR WELLS.....	Engineer, Bucyrus Steam Shovel and Dredge Co., Bucyrus, Ohio.....	Feb.	3, 1892
ROBINSON, JOHN JAMES.....	Sigua Iron Co., Santiago, Cuba.....	Apr.	3, 1889
TEMPLE, WILLIAM HENRY GILES.	65 Westminster st., Provi- dence, R. I.....	Feb.	3, 1892
WAINWRIGHT, JONATHAN	111 Fourth ave., Pittsburgh, Pa.....	Feb.	3, 1892
WAIT, JOHN CASSAN.....	Engineering Dept., Harvard University, Cambridge, Mass.....	Feb.	3, 1892

ASSOCIATE MEMBERS.

		Date of Election.	
ABBOT, FREDERICK WILLIAM....	(Care Read & Campbell), Mexico, Mexico.....	Oct.	7, 1891
CONOVER, ALLAN DARST.....	Professor Civil Engineering, University of Wisconsin, Madison, Wis. }	J. June	4, 1884
		Assoc. M. Feb.	3, 1892
HASBROUCK, CHARLES ALFRED...	Principal Assistant Engineer American Bridge Works, Chicago, Ill. }	J. March	7, 1887
		Assoc. M. Feb.	3, 1892
KYLE, GEORGE ALLEN.....	Assistant Engineer Northern Pacific R. R., Tacoma, Wash.....	Feb.	3, 1892
PERKINS, THOMAS ADIE.....	220 Loan and Trust Bldg., Ogden, Utah.....	Sept.	2, 1891
VOORHEES, PAUL.....	(Care New York Central and Hudson River R. R.), Buffalo, N. Y.....	Feb.	3, 1892

ASSOCIATE.

LINDENBERGER, CASSIUS HOWARD.	Wayne Hotel, Detroit, Mich.	Feb.	2, 1892
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JUNIORS.

BABB, CYRUS CATES.....	U. S. Geological Survey, Washington, D. C.....	Feb.	2, 1892
KINSEY, FRANK WILMARTH.....	10 South street, Newark, N. J.....	Feb.	2, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

FIESER, L. F.....	114 Lexington ave., Columbus, Ohio.
HALL, JULIEN A.....	Engineer for Grant Wilkins, Atlanta, Ga.
HERRICK, HENRY A.....	555 Haverhill st., Lawrence, Mass.
KASTL, ALEX. EDWARD.....	Sanitary District of Chicago, 526 Rialto Bldg., Chicago, Ill.
KILLEBREW, SAMUEL.....	Chief Engineer Location Vera Cruz and Tehnantepec Ry., Acayucan, Vera Cruz, Mexico.
MENDELL, GEORGE H.....	Col. Corps of Engineers, U. S. A., P. O. Box 2426, San Francisco, Cal.
MORSE, CHARLES J.....	1103 Manhattan Bldg., Chicago, Ill.
O'ROURKE, JOHN F.....	42 West 34th st., New York City.
REA, SAMUEL.....	Bryn Mawr, Pa.
RUSSELL, N. E.....	Bridgeport, Conn.

- SHIRREFFS, REUBEN.....1103 Main st., Richmond, Va.
 SIMPSON, GEORGE F.....Assistant Chief Engineer East Tenn. Land Co.,
 Harriman, Tenn.
 VAN AUKEN, ALVA M.....Room 2, Rialto Bldg., Chicago, Ill.

ASSOCIATE MEMBERS.

- HUMPHREY, WILLIAM S.....Bridge Engineer Missouri, Kansas & Texas
 Ry., Parsons, Kans.
 MODJESKI, RALPH.....El Toro, Orange Co., Cal.

JUNIORS.

- FERGUSON, WILLIAM L.....Grant, Indiana Co., Pa.
 FOWLER, CHARLES E.....44 Bryson and Bonebrake Block, Los Angeles,
 Cal.
 MCFARLAND, B. W.....The Solvay Process Co., Syracuse, N. Y.
 PURDY, CORYDON T.....119 The Rookery, Chicago, Ill.
 SHERWOOD, GEORGE W.....Riverside, Cal.
 SPEIDEL, H. S.....80 Fair st., Paterson, N. J.
 TENNEY, GEORGE O.....Lytle, Ga.
 WHEATLEY, ARTHUR C.....Vera Cruz & Tehuantepec Ry., Acayucan,
 Vera Cruz, Mexico.

FELLOW.

- GILMAN, CHARLES C.....Eldora, Iowa.

DEATHS.

- BUTTS, E. P.....Elected Junior, November 3, 1886; died Jan-
 uary 11, 1892.
 CLARKE, H. WADSWORTH.....Elected Member, March 15, 1871; died Febru-
 ary 23, 1892.
 DICKINSON, GEORGE C.....Elected Member, February 5, 1890; died Jan-
 uary 24, 1892.
 REED, EDWARD M.....Elected Member, July 10, 1872; died February
 13, 1892.
 WHITTON, ANDREW D.....Elected Member, May 6, 1891; died February
 23, 1892.

ADDITIONS TO

LIBRARY AND MUSEUM.

From American Institute of Mining Engi-
 neers:

Ancient Method of Silver Lead Smelting
 in Peru.

Experiments with the Roessler Convert-
 er, at the Marsac Refinery, Park City,
 Utah.

Granulating Magnetic Iron Ores with the
 Sturtevant Mill, at Croton Magnetic
 Iron Mines, N. Y.

Note on Sampling Iron Ore.

Notes on the Geological Origin of Phos-

phate of Lime in the United States and
 Canada.

Notes on the Selection of Iron Ores,
 Limestones, and Fuels for the Blast-
 Furnace.

Results of Stream Measurements of the
 United States Geological Survey.

Tests and Requirements of Structural
 Wrought-Iron and Steel.

The Control of Silicon in Pig-Iron.

The Determination of Iron in the Tails
 from Magnetic Concentration.

- The Florence Oil Field, Colorado.
 The "Great Gossan Lead" of Virginia.
 The Magnetic Concentration of Iron Ore.
 The Magnetic Iron Ores of Ashe County, N. C.
 The Preparation and Utilization of Small Sizes of Anthracite.
 The Simultaneous Production of Ammonia, Tar and Heating Gas.
 The Use of the McClave Grate and Argand Steam-Blower in Utilizing Small Sizes of Anthracite or Bituminous Slack in Boilers and Similar Furnaces.
- From Horace Andrews, City Engineer, Albany, N. Y.:
 Annual Report of the City Engineer for the year 1891.
 Proceedings of the Board of Contract and Apportionment of the City of Albany, 1883 to 1891.
- From Astor Library:
 43d Annual Report for the year 1891.
- From City of Montreal:
 Annual Reports for 1890.
- From E. L. Corthell, C. E., Chicago, Ill.:
 An Enlarged Water-way between the Great Lakes and the Atlantic Seaboard.
- From Engineering News Publishing Co., N. Y.:
 The Manual of American Water Works.
- From C. A. Hammond, Secretary, Boston, Mass.:
 Proceedings of the Twentieth Meeting of the American Society of Railroad Superintendents, October 12, 1891.
- From Harvard College, Cambridge, Mass.:
 Annual Report of the President and Treasurer, for 1890-91.
- From Institution of Civil Engineers, London, England:
 List of Members, January, 1892.
 Abstracts of Papers in Foreign Transactions.
 London and Southwestern Railway Widening Works.
- From Intercontinental Railway Commission, Washington, D. C.:
 Minutes, 1891.
- From L'Association Amicale des Anciens Elèves de l'Ecole Centrale, Paris:
 Annuaire, 1892-1891.
- From Mining Institute of Scotland:
 Transactions, Vol. XIII, Part 7.
- From North of England Institute of Mining and Mechanical Engineers:
 Transactions, Vol. XL, Part 4.
- From Edward P. North, C. E., New York:
 Nitrogen and Water in the Water Atoms and their Revelations.
- From Albert F. Noyes, City Engineer, Newton, Mass.:
 Annual Report of the City Engineer for the year 1890.
- From Ernest Pontzen, C. E., Paris:
 Note sur les conditions dans lesquelles s'effectuent les transports des céréales dans la Russie méridionale.
 Mémoires et Compte Rendu des Travaux de la Société des Ingénieurs Civils, 1855.
- From Prof. Jno. R. Proctor, State Geologist, Ky.:
 Geological Survey of Kentucky.
- From Public Library of Cincinnati:
 Annual Report of the Librarian and Treasurer for the year ending June 30, 1891.
- From Max E. Schmidt, Secretary, Chicago, Ill.:
 Multiple Speed and Traction Railway, (Movable Sidewalk.)
- From Robert Surtees, C. E., Ottawa, Can.:
 Annual Report of the Board of Water Commissioners for the year ending October 31, 1891.
- From U. S. Department of State:
 Special Consular Report. Gas in Foreign Countries.
 Reports of the Consuls, No. 133, October, 1891.
- From U. S. Geological Survey:
 81 Maps of the U. S. Geological Survey.
- From U. S. Naval Observatory:
 Washington Observations, 1887.
- From U. S. Treasury Department:
 Annual Report of the Light House Board, June 30, 1891.
- From U. S. Navy Department:
 Pilot Chart of the North Atlantic Ocean, February, 1892.
- From U. S. Ordnance Department:
 Notes on the Construction of Ordnance, No. 59.
- From U. S. War Department:
 Army Register for January, 1892.
- From U. S. War Department, Chief of Engineers:
 Reports of Engineering Officers, as follows:
 Upon the Construction of the Building for the Library of Congress.
 Of the Commerce passing St. Mary's Falls Canal.
 Of Board of Engineers on Clay in Big Sandy River, near Louisa, Ky.
 In Reference to the Appropriation for the Improvement of the Waterway between New River and Swansboro, N. C.
 Of the Examination and Survey of the Sabine River, Texas; the Murderkill River, Del.; West Galveston Bay, Texas; the Savannah-Fernandina Waterway, Conneaut Harbor, Ohio; the Susquehanna River above Havre de Grace, Md.; Rock Hill Harbor, Md.; Mispillion River, Del.; St. Louis River, Wis.; Grand River, Ohio; Brazos River, Texas; Port Day, N. Y.; Swinomish Slough, Wash.; Willamette River, Oregon; Canapitsit Channel, Mass.; Menemsha Bight, Wash.; Olympia Harbor, Wash.; Tillamook Bay and Bar, Oregon; Potomac River, Va. and Md.; Eastern Branch of the Potomac River, Lynnhaven Bay, Va.; Clarendon and White River, Ark.; Missouri River, Montana; for a deep water harbor on the Pacific Coast, for inside route between Doloy and Sapelo, Ga.; Brunswick Outer Bar, Ga.; Red River of the North, Big Stone Lake, South Dakota, Jamaica Bay, N. Y.; San Joaquin River, Cal.

- On the Names and Residences of Civilian Engineers.
 Suggesting the Extension of the Limits of the Upper Columbia and Snake River. Relative to the Feasibility of Completing the Tunnel between the two reservoirs in the District of Columbia.
 From R. W. Ware, N. Y.:
 Grinnell Automatic Sprinkler.
 From Welton and Bennett, Engrs., Waterbury, Conn.:
- Twenty-fifth Report of the Board of Water Commissioners of the City of Waterbury for the year ending Dec. 31, 1891.
 From E. D. Worcester, Secy., N. Y.:
 Annual Reports of the Michigan Central Railroad Company, 1877, '78, '79, '81, '82, '83, '84, '86 to '90.
 Annual Reports of the N. Y. Central and Hudson River R. R. Co., 1852-1869, 1870-1891.

BOOK NOTICES.

THE MANUAL OF AMERICAN WATER WORKS, COMPILED FROM SPECIAL RETURNS, 1890-91.

M. N. BAKER, Ph. B., Editor. $6\frac{1}{2} \times 9\frac{1}{2}$ inches, cloth, pp. xliii. + 384.
 Engineering News Publishing Co. New York, 1892.

This, the third annual issue of this Manual, contains, like the preceding, the History, Distribution, Consumption, Revenue and Expenses, Cost, etc., of the Water Works of the United States and Canada, together with summaries of each State and group of States, and classification by size of towns having works.

All of the water works known to be in operation or under construction July 1, 1891, are described, and there is also given brief descriptions of such projects as are likely to develop into works.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—March, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MARCH 2D, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected—as Members: Daniel Marshall Andrews, Lock Three, Ala.; James Duane, New York City; Charles Benjamin Dudley, Altoona, Pa.; Roberto Gayol, Mexico, Mexico; Justus Herbert Grant, Rochester, N. Y.; Harvie Childs Lowrie, Denver, Colo.; George Fillmore Swain (elected Associate September 5, 1883); Samuel Everett Tinkham, Boston, Mass. As Associate Members: Albert Carr, New York City; Leslie Warren Goddard, Grand Rapids, Mich.; Henry Hamilton Kerr, Fort Worth, Texas.

The death of H. Wadsworth Clarke, M. Am. Soc. C. E., on February 23d, 1892, and the death of Andrew D. Whitton, M. Am. Soc. C. E., on February 23d, 1892, were announced by the Secretary.

A paper by E. Kuichling, M. Am. Soc. C. E., on "The Loss of Head resulting from the passage of water through a 24-inch Stop-Valve," was read and discussed by D. Farrand Henry, J. Foster Crowell, Clemens Herschel and E. A. Fuertes.

A paper by Lewis Kingman, M. Am. Soc. C. E., on "Electric Lighting at Topeka, Kans.," was read.

Discussion upon the paper by William Starling, M. Am. Soc. C. E., on "The Holland Dikes," was continued by Messrs. Robert Cartwright, Clemens Herschel, Wm. E. Worthen, E. A. Fuertes, Charles B. Brush, Edward P. North, J. Foster Crowell, John Bogart, W. R. Hutton, Mendes Cohen and J. James R. Croes.

MARCH 16TH, 1892.—The Society met at 20 o'clock, Director O. F. Nichols in the chair; F. Collingwood, Secretary.

A "Description of the Boston Water Works," illustrated by the stereopticon, was given by Desmond FitzGerald, M. Am. Soc. C. E. The subject of Puddle Cores in Dams, etc., was discussed by Messrs. FitzGerald, A. F. Sears, Robert Cartwright, John Bogart, Joseph P. Davis, T. H. McCann, J. James R. Croes and A. Fteley.

OF THE BOARD OF DIRECTION.

MARCH 1st, 1892.—The time and place for the Annual Convention were considered. The following resolution was adopted:

Resolved, That the President appoint a Committee on the procuring of papers, to consist of seven members, one from each of the districts defined at the last Convention, the Chairman of which shall be the Secretary.

The work of this Committee shall be to arouse the interest of members and urge upon them the duty of presenting to the Society papers descriptive not only of their successful works, but recording for the benefit of all, the experience not infrequently acquired by failure. It will be expected to present a monthly report.

The President appointed the following Committee: First District, F. Collingwood; Second, P. A. Peterson; Third, S. M. Gray; Fourth, Theodore N. Ely; Fifth, Abraham Gottlieb; Sixth, James D. Schuyler; Seventh, B. M. Harrod.

Applications were considered.

The following were declared elected—As Honorary Members: Allan Campbell, New York City; William C. Young, Chicago, Ill. As Juniors: Werner Boecklin, Eugene Lentilhon, Holton Duncan Robinson, New York City; John William Tumbridge, Waterbury, Conn.; Domingo Anthony Usina, Savannah, Ga.

MEMOIRS OF DECEASED MEMBERS.

MONCURE ROBINSON, Hon. M. Am. Soc. C. E.*

DIED NOVEMBER 10TH, 1891.

[In the preparation of the accompanying memoir the writer has availed himself very freely of an admirable "Sketch of the Professional Biography of Moncure Robinson," prepared about three years ago by one of his own assistant engineers, Mr. Richard B. Osborne, C. E., and published for private circulation. It is desired that full credit be given to Mr. Osborne for nearly the entire information, some of which has been quoted almost literally.]

Moncure Robinson was born at Richmond, Va., in 1802, and was the eldest son of John Robinson, a well known merchant of that city, of the

* Committee to prepare the memoir: Joseph M. Wilson, M. Am. Soc. C. E.

firm of Moncure Robinson & Pleasants. His education commenced at the early age of six years, in the Gerardine Academy, under Mr. Gerardine, a French gentleman of great literary ability, and he entered William and Mary College when only thirteen years old, applying himself so diligently and advancing so rapidly in his studies, that three years later, although then the youngest student in the college, he had passed all his examinations in preparation for graduation with the degree of A. M. His opportunities under the Professor of French (the father of General Fremont), added to his previous training with Mr. Gerardine, enabled him to acquire a knowledge of that language which proved of great service to him in after years in his intercourse with members of his profession abroad.

Young Robinson was at first intended for the law, but, notwithstanding talents which he had already shown in this direction, his taste for engineering pursuits led him another way.

The Board of Public Works of Virginia, having arranged, in the year 1818, for a topographical survey and line of levels across the State between Richmond and the Ohio River, Mr. Robinson saw his opportunity and immediately applied for an appointment in the engineer corps. A refusal on account of his youth did not deter him, and renewed efforts brought permission for him to accompany the party as a volunteer without pay. This independent position just suited him; and, mounted on his own horse, he was enabled to explore the country, often in advance of the party, not being confined to routine work, and to render such valuable aid that he came to be recognized not as a follower, but a leader.

His labors in this work and his manly bearing through all the exposures and privations necessarily accompanying it, notwithstanding his youth and naturally not very strong constitution, added to the fact of his gratuitous service, contributed not a little to his early reputation.

When nineteen years of age Mr. Robinson was enabled, through the courtesy of Governor DeWitt Clinton and Canvas White, of New York, to make a professional inspection of the Erie Canal, then under construction. At about the same time (1821) he was engaged in making a location for a short extension of the James River Canal. He afterward widened a portion of this canal and then lengthened it some 30 miles, but when subsequently it was determined to still further extend it to Covington, about 250 miles additional, and Mr. Robinson was asked to undertake the work, he respectfully declined, at the same time advancing strong arguments against it and in favor of a railroad, his opinion being largely based upon his examinations in reference to the Erie Canal.

Mr. Robinson visited Europe in 1825 and was absent for nearly three years, during which he applied himself to the direct advancement of his professional knowledge. He first went to France, where he had oppor-

tunities of investigating the great public works of that country, particularly its harbor improvements, and was also enabled to attend the winter lectures of its scientific and mathematical schools.

He afterward traveled through England and Wales, not only meeting and becoming acquainted with the leading members of his profession, but enjoying exceptional advantages for increasing his practical experience by inspection of important works under actual construction. The chief subject of discussion among European engineers and capitalists, at that time, was that of railways; the Liverpool and Manchester line was being constructed under Mr. George Stephenson; professional opinions on all matters connected with this new departure were being eagerly sought, and by what he saw and heard Mr. Robinson was only still further confirmed in the views as to their utility which he had already expressed at home.

After Mr. Robinson's return to the United States in the beginning of 1828, he was requested by the Canal Commissioners to make surveys for the Pottsville and Danville Railway, a project intended to develop the anthracite coal trade of that region. Stephen Girard, who had large interests in the coal lands of the Mahanoy Valleys, was the moving spirit of this improvement, and was instrumental in placing Mr. Robinson in charge of the work and ordering its construction. He furnished \$200,000 toward its prosecution during the first six months of its progress, but his death prevented its completion on the plan originally intended, which contemplated the drainage of the Girard estate, and the use of water as a source of power on inclined planes and as a counterbalancing weight for return of empty cars.

* In December, 1828, Mr. Robinson was appointed by the Board of Canal Commissioners of Pennsylvania, Engineer of the Allegheny Mountain portage, with instructions directing his attention to three points:

First.—The construction of a railway overcoming the summit by means of stationary engines or self-acting planes.

Second.—The construction of a macadamized turnpike of the best kind between the same points.

Third.—The suggestion of any other plan which might occur to him as calculated to afford the best accommodation to trade.

Mr. Robinson made his report to the Commissioners November 1st, 1829, and expressed his views and opinions fully on the points submitted to him, concluding with a very decided recommendation of the railroad as the most eligible plan of improvement.

In accordance with the provisions of an Act of the Legislature passed in March, 1830, the Board of Canal Commissioners appointed Moncure Robinson, Colonel Stephen H. Long and Major John Wilson, engineers to make examination of the different routes for crossing the Allegheny

* Extracts from "Notes on the Internal Improvements of Pennsylvania," by W. Hasell Wilson, C. E., 1879.

Mountains, with instructions "to take into view a portage by means of a road so graded as to admit of its being adapted either to a macadamized turnpike or to a railroad."

Two of the engineers having had "no personal knowledge of the localities to be traversed by the contemplated road, nor of the nature of the obstacles to be overcome," deemed it necessary to institute a course of examination and surveys, and with this view a party was organized under the immediate direction of Colonel Long, and employed from the beginning of August until the close of the year.

A brief report upon the general features of the case was presented by Colonel Long and Major Wilson, directly after the completion of the surveys, in order to be included in the annual report of the Commissioners to the Legislature, which was required to be made in December. Early in the month of March succeeding, a report in detail was submitted by Colonel Long, accompanied by plans and estimates. This was followed by one from Mr. Robinson reviewing and sustaining his report of the previous year. While all of the engineers concurred in deeming a railroad preferable to a turnpike, and in recommending the route crossing the mountain at Blair's Gap, there was some difference of opinion among them as to details, the principal points involved being the adoption of a tunnel at the summit, and the character of the inclined planes.

Mr. Robinson advocated the tunnel, and urged very strongly the importance of having the planes straight, even at an increase of the angle of inclination, which in the planes located by him varied from $3\frac{1}{2}$ to 9 degrees, and in one instance to a higher figure. The other two engineers were desirous "to obviate the necessity for a tunnel until such time as the exigencies of the trade upon the road should require it, and to avoid the adoption of inclined planes having a greater inclination than 5 degrees, limiting their inclination, if possible, to 3 degrees." (For Mr. Robinson's report see *Transactions Am. Soc. C. E.*, Vol. XV, March, 1886.)

The Canal Commissioners avoided making a decision, preferring to leave the settlement of the question to the Legislature, to whom the reports of the engineers were referred. The road, as authorized by Act of Assembly, was constructed generally according to Mr. Robinson's location, but without a tunnel at the summit, and with straight inclined planes at angles of inclination ranging from 4 to 6 degrees.

In consequence of the large increase of trade and the delays experienced in operating the planes, a new road was subsequently constructed with a tunnel at the summit, and without inclined planes, by adopting a gradient of 75 feet per mile, which the improvements in locomotive engines rendered admissible.

Between 1830 and 1832 Mr. Robinson supervised a large amount of railroad construction in Virginia, notably the Richmond and Petersburg, the Richmond and Fredericksburg, the Winchester and Potomac, and

the Petersburg and Roanoke railroads. On the latter was a bridge 2 844 feet in length, consisting of nineteen spans of 140 to 153 feet each, and 60 feet above the water, a structure for which Mr. Robinson obtained great credit on account of its efficiency and economical cost.

In 1834 Mr. Robinson was called upon to undertake the location and construction of the Philadelphia and Reading Railroad, a work that shows most forcibly in its capacity to transport economically the immense special traffic for which it was built, the genius, and capability of its first engineer, and may well be said to be the "crowning achievement of his professional career."

When it is remembered how little our country had developed at that time and how immense its expansion has been since, there are few engineers who could have anticipated so clearly and successfully as Mr. Robinson has done, the character and quantity of trade, present and prospective, in each direction, to be provided for on this road.

Then with rare judgment he regulated the alignment and gradients so as to adapt them to the most advantageous movement of this traffic, not only the great coal trade, but a large mixed business which would necessarily be built up on such a line of railway.

Mr. Robinson's conclusions were few and simple. The first was that no ascending grades should be used running east from the coal region to the Columbia Railroad Bridge over the Schuylkill, at Philadelphia. Secondly, that all other grades which, as a consequence, if not level, would be descending going east, should not exceed 19 feet to the mile, this being adopted with the view of allowing an engine to bring back empty the same number of cars which it could take down to the terminus loaded. Thirdly, that no curvature should exceed 7 degrees.

In 1836 Mr. Robinson visited England for the purpose of negotiating a loan for the completion of the road, and the first foreign loan for this company, amounting to \$2 000 000, was successfully placed. In this visit his professional intercourse among England's noted Civil Engineers was greatly extended, and opportunities occurred, of which he eagerly availed himself, for examination of important works in process of execution.

Mr. Robinson returned to the United States in 1837. During his absence the construction of the road had been progressing under the direction of Wirt Robinson, Resident Engineer, and Principal Assistant Engineers W. M. C. Fairfax and W. Hasell Wilson, and on the 4th of July, 1838, the portion between Reading and Norristown was opened for traffic, including on this division the Black Rock Tunnel at Phoenixville, 1 932 feet in length, and the Black Rock stone bridge, with its four spans of 72 feet each, remarkable as being the first large stone bridge structure built in the United States for a double track railway, and even now noted for the small cubic contents of its masonry. At that time some of the directors of the company strongly advocated a junction

with the Norristown Railroad, operating between Norristown and Philadelphia, and the abandonment of the portion of the Reading road east of Norristown.

Against this Mr. Robinson strongly protested, stating very plainly to the Board that if this course was persisted in, he would not be a party to what he considered as destructive to the interests of the Philadelphia and Reading Railroad, and requesting that in such case they should consider his resignation in their hands.

Mr. Robinson carried his point, and the completion of the line on the original plan was accomplished. The extension of the road to Pottsville was also carried out, and it was owing to Mr. Robinson's sagacity and foresight that the extensive property at Richmond, now the great shipping depot for coal, was bought by the Reading Railroad Company, and the Richmond Branch from the Falls of Schuylkill built.

In 1838-40 Mr. Robinson had a locomotive constructed from his own designs as an experiment for the Reading Railroad service, the work being executed by Messrs. Eastwick & Harrison, a firm of Philadelphia machinists, and its performance gave such remarkable results that the published accounts of its success occasioned an offer to Mr. Robinson from the Czar of Russia of a position as engineer on the great system of railroads then about being developed in the Russian Empire. Mr. Robinson did not feel justified in making an arrangement which would involve prolonged absence from home and severance of all professional engagements in this country, but as a consequence of this offer, through the courtesy of Mr. Robinson, the Russian Government ultimately closed a contract with Messrs. Eastwick & Harrison, who transferred their business to that country, and after a few years' absence returned with gratifying results.

About the year 1839 Mr. Robinson made a reconnoissance from Brunswick in Georgia on the Atlantic Coast, across the north-west portion of Florida to the Gulf of Mexico, under instructions to report on the best route for either canal or railroad to connect these places. His decision was in favor of a railroad, with the western terminus at the mouth of the Appalachicola River.

In 1842 Mr. Robinson and Commodores Shubrick and Conner were appointed by the Secretary of the United States Navy as commissioners to make an examination and report on a proper site for the great dry dock proposed to be built in the harbor of New York. Mr. Robinson drew up the joint report, which was accepted and the dock located as recommended at Wallabout. This was Mr. Robinson's last professional engagement, and in 1847 he retired from the practice of his profession. Although often afterward consulted, his advice was given gratuitously.

The testimony of those who have served under Mr. Robinson professionally, some of whom have become eminent in the service, is united as to the great merit of his system and discipline for the education of

the engineer. While requiring from those under him strict obedience to general orders, yet Mr. Robinson left them as officials in a manly independence of position, with full opportunity to exercise professional talent, and to carry out, each in his own way, the duties assigned to him. Many of the engineers who went through this school have, in their after career, by occupation of prominent positions and length of service, rendered credit to themselves and their honored chief.

Mr. Robinson continued throughout the remainder of his life financially connected with important improvements, where his professional experience proved of great value to him. He married, in 1835, Charlotte Randolph, daughter of Bennett Taylor, Esq., a prominent member of the bar in Richmond, Virginia, and made his permanent residence in the City of Philadelphia, where he died November 10th, 1891, leaving his wife and eight children as survivors.

The position of civil engineer in this country at the time Mr. Robinson commenced his career, was not what it is to-day. Many impediments existed in the way of recognition and advancement; but amidst all of these, with no capital but a sound liberal education and good judgment, he advanced steadily, constantly availing himself of opportunities for improvement, by study of great works under progress both at home and abroad, "rising rapidly in the estimation of his countrymen, constructing some of the greatest works of the period, and, as an American engineer, solicited by Russia, France and Prussia to devote his services to the development of their contemplated great systems of public improvements." Mr. Robinson was thus the first American engineer to receive that recognition abroad which has since been extended to others who in later years have merited it.

Mr. Robinson was made an Honorary Member of the American Society of Civil Engineers July 6th, 1853.

WILLIAM EMERY MERRILL, Lieut. Col. U. S. Engineers, M. Am. Soc. C. E.*

DIED DECEMBER 14TH, 1891.

Colonel Merrill was born at Green Bay, Wisconsin, October 11th, 1838. His father was Captain Moses E. Merrill, of the Fifth Infantry, who was killed during the Mexican War in the assault on the Molino del Rey.

Young Merrill entered as a Cadet at the West Point Military Academy in June, 1854, and graduated at the head of his class in 1859, having

* Committee to prepare Memoir, Mr. Latham Anderson, M. Am. Soc. C. E.; Mr. G. B. Nicholson, M. Am. Soc. C. E.; Mr. G. Bouscaren, M. Am. Soc. C. E.

maintained the first place every year during his cadetship. Upon his graduation he was appointed a brevet Second Lieutenant in the Corps of Engineers.

Colonel Merrill's services and experience during the war were varied, and, during the last two years, of the highest importance. Without the success of our armies in Tennessee and Georgia, the failure of the Federal cause was a foregone conclusion. All the supplies had to be carried over that most vulnerable of all means of transportation, a single line of railroad over 300 miles long, in the heart of the enemies' country, and in the presence of daring and enterprising cavalry raiders. Colonel Merrill (then a Captain of Engineers but twenty-seven years of age) was charged with the protection and maintenance of this line, so vital to our armies. The result of the Federal campaigns in this field demonstrates the brilliant success attending the performance of this momentous duty. It is safe to say that no other engineer officer, in the army, of his age and rank, was charged with so great a responsibility, and for so long a time. Such being the case, it may be justly claimed that no engineer of his rank contributed so much to the final result.

But Colonel Merrill's services to his country did not terminate with the war. Since then he has designed and executed internal improvements which confer a lasting benefit to this nation. The following is a list of the principal works upon which he was employed as chief or in consultation with others.

As member of Army Boards to report on proposed railroad bridges across navigable streams, as follows: Between Cincinnati and Newport, Niagara River at Buffalo, across the Mississippi at Lacrosse, bridging channel between Lake Huron and Lake Erie, across the Mississippi at Louisiana, Mo.; across Genesee River, Monroe County, N. Y.; St. Louis Bridge, Carondelet, Mo.; Cincinnati Southern Railroad Bridge, at Cincinnati, across the Ohio River, at Beaver, Pa.

The Bills of 1873 and 1882 fixing the heights and lengths of spans were drafted by him. He was also assigned to the improvement of the following harbors:

Southern end of Lake Michigan, St. Louis, Alton and Toledo. Also as part of his Ohio River work, the harbor of refuge above Cincinnati, the harbor at Louisville, and the harbor of refuge at Beaver.

He was employed on the surveys, plans and estimates for the following canals: Extension of the Chesapeake and Ohio Canal, route from Youghiogheny River to Cumberland; central route, via Ohio and Kanawha Rivers.

He was a member of the Board for establishing water gauges for the Mississippi River. Member of the Light House Board 1873 to 1878. He was engaged on the survey and plans for the improvement of the Upper Fox River, Wisconsin. Also on report of "Progress of Works at South Pass of the Mississippi." But the great work of the latter part of his

life was the improvement of the Ohio River and its tributaries (except the Cumberland and Tennessee), of which he was in charge as Chief Engineer after 1870. Even an outline of all the works accomplished by him in these twenty-two years would be too voluminous for this notice. Probably it has never fallen to the lot of any engineer in modern times to have, for such a length of time, sole charge of the improvement of such a great stream. The War Department showed its appreciation of his professional distinction by sending him twice on important missions to Europe; first to obtain information on the subject of movable dams, and afterward as the country's representative in the World's Congress of Engineers at the Paris Exposition in 1889.

The most noted and striking piece of work done by Colonel Merrill, is the movable dam at Davis Island. These dams, the inventions of the French Engineers MM. Chanoine and Poiree, had been used in France for the canalization of small streams. The French Engineers themselves expressed to Colonel Merrill their doubts as to the practicability of this type of dam on so large a scale as would be required in a stream of such magnitude as the Ohio River. Public sentiment in this country was skeptical and sometimes actually hostile.

Colonel Merrill was industrious in literary professional work. His services on several of the Boards to report on railroad bridges across navigable waterways, called his attention to the fact that there was no standard American work on this subject. His "Iron Truss Bridges for Railroads," published in 1870, was one of the first books in this department of engineering literature, and although it has, owing to the development of the science, long since become obsolete, it is a model in accuracy, clearness and simplicity of style. He also translated several of the professional papers of the Corps des Ponts et Chaussées, which appear in the papers of the United States Engineers. He joined the American Society of Civil Engineers, October 6th, 1872, was a Director for the year 1883, and a member of the Committee on the Nomenclature of Building Stones, Paper CLI, 1877. He also participated in discussions of many papers before the Society.

He was one of the organizers of the Engineers' Club of Cincinnati, and one of its earnest workers, ever ready either in papers or discussions to contribute, from his great fund of information, matter of value to his hearers.

For years he was one of the most prominent, active and useful members of the Vestry of St. Paul's, Newport, frequently acting as one of the lay delegates in the Diocesan Convention. In January, 1873, he married Miss Margaret E. Spencer, daughter of the late Dr. John C. Spencer, of Cincinnati. Colonel Merrill is survived by his wife and eight children.

Colonel Merrill's social and moral traits were no less admirable than his professional standing. His conversation was enlivened by a keen,

refined, yet dignified vein of humor, and his manners were kind and cordial. The highest ideas of honor, integrity, duty, controlled his actions, and formed a character which commanded the respect and esteem of all. From a social, moral or professional standpoint his record remains a model for the imitation of the young engineer.

HENRY WADSWORTH CLARKE, M. Am. Soc. C. E.*

DIED FEBRUARY 23D, 1892.

Henry Wadsworth Clarke, of Syracuse, N. Y., a member of the American Society of Civil Engineers (1871), was born near Harford, Susquehanna County, Pa., November 6th, 1837. His parents removed to Syracuse previous to the anniversary of his first birthday, and he was a resident of that city during the remainder of his life. He received his early education in the public schools of Syracuse, and was a member of the first class graduating from the High School. Mathematical studies were his favorites, and he was ambitious to acquire a thorough training therein. On account of poor health, however, he was obliged to deny himself and to forego a college course which he had contemplated.

In 1856 he entered the office of the City Surveyor of Syracuse as an assistant, and secured his first practical experience. From that time until 1864, when he was first appointed City Surveyor and Engineer, he was engaged in miscellaneous work in the city and county. By request of George Geddes he undertook a survey to determine the thickness and dip of the geological strata of Onondaga County, the result of which was published in the "Transactions of the State Agricultural Society for 1859."

He served as City Surveyor and Engineer from 1864 to 1869, except during nine months when absent in the army. In September, 1864, he declined a captaincy in the 185th Regiment of the New York State Volunteers, to accept the position of First Lieutenant of the same company, which position he held until the close of the war. He participated in the battles of Quaker Road (March 29th, 1865), Gravelly Run (March 31st, 1865), Five Forks (April 1st, 1865), and Appomattox Court House (April 9th, 1865). At Lee's surrender he was serving temporarily on the staff of General J. L. Chamberlain, commanding First Brigade, First Division of the Fifth Army Corps as pioneer officer. From 1869 to 1877 he was identified with every engineering project of importance in the city and county, principal

* Committee to prepare Memoir, Mr. Henry C. Allen, Assoc. M. Am. Soc. C. E.

among which was a survey for the improvement of the channel of Onondaga Creek as it passes through Syracuse. He was subsequently engineer in charge of the work which was developed by his survey.

From 1877 to 1886 he was employed by a "Joint" Boundary Commission as engineer in charge of the re-survey and adjustment of the boundary line between New York and Pennsylvania, and in 1881-82, as an associate with Professor E. A. Bowser, of New Brunswick, N. J., he performed a similar service upon the boundary line between New York and New Jersey.

In 1890 he was appointed City Engineer of Syracuse, but after a struggle of eight months with the preliminary assaults of the malady (a malignant tumor of the mediastinum) which finally conquered him, he was obliged to resign his office and practically retire from business. After a long period of waiting and suffering, having a full knowledge of the fatal character of his illness, on February 23d, 1892, he died, as he had lived, a fearless man.

Throughout his life he was a wide reader, and a careful and painstaking student. It was his natural inclination to thoroughly master the details of every question arising in his career. His friends and associates early learned to respect, and to act upon the conclusions reached by this careful, thoughtful man, and seldom failed to profit thereby.

An honest and competent engineer, a brave soldier, an energetic member of the militia, an enthusiastic Grand Army comrade, and a faithful friend, Major Clarke will long live in the memory of those who knew him.

EDWARD M. REED, M. Am. Soc. C. E.*

DIED FEBRUARY 13TH, 1892.

Edward M. Reed was born in Lancaster County, Pa., November 17th, 1821. His ancestors for two generations at least were residents of the Keystone State. His father in his early life followed the profession of an architect and builder.

Mr. Reed's early educational advantages were those afforded by the common schools of his native place. At sixteen years of age he was apprenticed to a machinist of Lancaster, working in the machine shop owned by Boone & Cockley, and after serving his apprenticeship of four years he was made general foreman of the shop. From this position he went into the machine shop of the Baltimore and Ohio

* Committee to prepare Memoir, Mr. F. S. Curtis, M. Am. Soc. C. E.

Railroad, and in 1843 he was appointed a locomotive engineer on the same road.

In 1845 he was appointed by the Philadelphia and Reading Railroad Company Master Mechanic of their Port Richmond shops at Philadelphia. In the same year he resigned and accepted a position in Cuba on the Havana and Guines Railway as Superintendent and Master Mechanic.

Three years later, in 1848, he left the West Indies and came to Connecticut, commencing his duties there with the Hartford and New Haven Railroad Company, first as locomotive engineer, but serving in this capacity for only a few months, as within the same year he was appointed Master Mechanic of the same company, which position he retained until September, 1853.

From the beginning of his railroad experience he took much interest in civil engineering, making it a special study, but had no opportunity to obtain any practical knowledge in this branch of work until the building of the second track of the Hartford and New Haven Railroad, between 1850 and 1853, in which he assisted to a considerable extent in addition to performing his duties as Master Mechanic. By close attention, and being quick in acquiring the knowledge of the construction and general operation of the road, he was promoted in 1853 to the office of Superintendent and Engineer. This official position he retained until the consolidation of the Hartford and New Haven and the New York and New Haven Railroads in 1872, when he was appointed General Superintendent of the consolidated company—The New York, New Haven and Hartford Railroad Company. This position he held until 1874, when he was elected director and Vice-President of the company, still continuing as General Superintendent.

In 1886 his duties had so increased, that by reason of advancing age and failing health he found it necessary to resign the office of General Superintendent, retaining, however, the Vice-Presidency of the company until his death, February 13, 1892.

“Forty-nine years of active railroad service” can be said of very few, and it is especially worthy of note in Mr. Reed’s case that for forty-four years he was continuously with, practically, one railroad company. His long and successful service speaks for itself and shows plainly the high esteem in which he was held by the company.

During his railroad experience his special forte and delight seemed to be that pertaining to civil engineering. Some of the most important structures planned and built by him or done under his supervision are: The railroad bridge over the Connecticut River at Warehouse Point, Conn.; the bridge, including draw span, over the Housatonic River at Naugatuck Junction, Conn.; the drawbridge over Pequonnock River, Bridgeport, Conn.; three spans of the bridge, including draw span, over Mianus River, Cos Cob, Conn.; the draw-

bridge across the bay at Pelham, N. Y.; the stone arch bridge, near Berlin, Conn., over the Mattabesset River, built in eight spans of 23 feet each; the stone arch bridge, near Nayden's Station, Conn., over the Farmington River, built in seven spans of 55 feet each; the elevated structure at Hartford, Conn., and the tunnel a short distance east of the station, through which run both the tracks of the New York, New Haven and Hartford Railroad, and the New York and New England Railroad; the passenger station at New Haven; also the construction of the Suffield and New Britain branches.

He became a member of the American Society of Civil Engineers July 10th, 1872.

He was an apt student, a close observer, and his quick insight was perceptible to all with whom he came into contact.

Yale University of New Haven recognized his services and scientific attainments, by honoring him in 1885 with the degree of Master of Arts.

JAMES ROBERT WARDLAW, M. Am. Soc. C. E.*

DIED DECEMBER 27TH, 1891.

James Robert Wardlaw was born in the City of Brooklyn, N. Y., September 9th, 1856. Some years afterward his parents removed to New Brighton, S. I.; his father being, during his life, in the wholesale dry goods trade of New York City.

Mr. Wardlaw received a common school education, and afterward entering Columbia College, he graduated from the School of Mines as Civil Engineer, with the degree of S. B., in June, 1876. He at once entered actively into his profession, holding the position of rodman on the Morris and Essex Railroad, which he retained until the fall of 1877, when he accepted the position of transitman with the firm of Cary & Tilden, City Surveyors, in Brooklyn, N. Y., there he remained until the spring of 1879. Being ambitious, he had pushed rapidly ahead by hard study, and was then appointed Village Engineer of New Brighton, S. I., which position he retained for about one year. He resigned this position to go with a party of friends to Colorado, to engage in mining, in which he was quite fortunate. He gave up this employment at the earnest request of his father, who feared that the rough life of a mining camp would prove injurious to his health, which was never very strong, he having inherited from his mother a tendency to lung troubles.

After his return from the West he was married in November, 1880, to Miss Minnie Post, of Staten Island, who with two children survives him.

* Committee to prepare Memoir, Mr. Wm. J. Haskins, M. Am. Soc. C. E.

For the next three years he was engaged on various railroad work in New York, New Jersey and Pennsylvania; and in November, 1883, entered the employ of the City of New York, as transitman. From this he was promoted to be Assistant Engineer, after having passed the Civil Service examination with credit; which position he retained until July, 1887, when he opened an office of his own for general engineering practice, receiving from the City of New York quite a large amount of work as City Surveyor in Charge of Construction.

In the fall of 1885 he had a very severe attack of pneumonia, from which he never fully recovered; and the disease, which had now fairly a foothold, made rapid progress, until he was in the spring of 1890 obliged to give up business. However, after a short rest he accepted employment with Mr. C. B. Brush, M. Am. Soc. C. E., taking charge of some surveys in New Jersey, and remaining with him until the doctors finally in May, 1891, ordered that he should go West. After his arrival in Colorado he became more hopeful, but the disease was too deeply seated to be helped by any human power—though he felt an improvement there was in reality none, and on Christmas, 1891, after writing a most hopeful letter to his family, he was taken with a violent hemorrhage. From this time he seemed in a very weak state until December 27th, when, being attacked with another hemorrhage, he passed peacefully away.

His remains were brought East and buried in his family plot in Greenwood.

Mr. Wardlaw was elected a Member of the American Society of Civil Engineers March 3d, 1886.

LIST OF MEMBERS.

ADDITIONS.

HONORARY MEMBERS.

		Date of Election.
CAMPBELL, ALLAN.....	125 Lexington ave., } M. New York City... }	Feb. 19, 1868
YOUNG, WILLIAM C.....	468 West 24th st., New York City	Hon. M. March 1, 1892 March 1, 1892

MEMBERS.

ANDREWS, DANIEL MARSHALL....	Coosa Valley, St. Clair Co., Ala.	March 2, 1892
DUANE, JAMES.....	589 East 134th st., New York City	March 2, 1892
DUDLEY, CHARLES BENJAMIN....	Chemist Pennsylvania R. R., Altoona, Pa.....	March 2, 1892
GAYOL, ROBERTO.....	P. O. Box 766, Mexico, Mexico.	March 2, 1892
GRANT, JUSTUS HERBERT.....	81 and 82 German Insurance Co. Bldg., Rochester, N. Y..	March 2, 1892
LOWRIE, HARVIE CHILDS.....	P. O. Box 2196, Denver, Colo..	March 2, 1892
TINKHAM, SAMUEL EVERETT....	Assistant Engineer, Engineer- ing Dept., City Hall, Boston, Mass.....	March 2, 1892

ASSOCIATE MEMBERS.

CARR, ALBERT.....	Blythebourne, Kings Co., N. Y.	March 2, 1892
CONNOR, EDWARD HANSON.....	Assistant Engi- neer N. Y., L. E. & W. R. R., 21 Cortlandt st., New York City. }	Jun. Feb. 5, 1890 Assoc. M. Feb. 3, 1892

JUNIORS.

BOECKLIN, WERNER.....	228 West 38th st., New York City	March 1, 1892
LENTILHON, EUGENE.....	Dept of Docks, foot East 16th st., New York City.....	March 1, 1892
ROBINSON, HOLTON DUNCAN....	211 West 129th st., New York City	March 1, 1892
TUMBRIDGE, JOHN WILLIAM....	Hotel St. George, Brooklyn, N. Y.....	March 1, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

HARING, JAMES S.....	463 The Rookery, Chicago, Ill.
STEWART, JOHN M.....	Assistant Engineer Dept. of Docks, Pier A, North River, New York City.

ASSOCIATE MEMBERS.

- ARENTZ, F. C. H. Hathaway Bldg., Room 43, Milwaukee, Wis.
 WILLARD, J. MILTON. 52 Commerce Bldg., Chicago, Ill.

JUNIORS.

- BAUM, GEORGE Passaic Falls, Paterson, N. J.
 CRANE, WILL E. 37 South Fitzhugh st., Rochester, N. Y.
 STANFORD, H. R. Alton, Ill.

DEATH.

- MORTON, JOHN H. Elected Member June 3, 1891; died February 8, 1892.

ADDITIONS TO LIBRARY AND MUSEUM.

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|---|---|
| From Argentine Scientific Association,
Buenos Ayres:
El Paramillo de Uspallata. | From Institution of Mechanical Engineers
London:
Proceedings, October, 1891. |
| From Boston Public Library:
Fortieth Annual Report. | From Fred. H. Lewis, C. E.:
Soft Steel in Bridges. |
| From Boston Manufacturers' Mutual Fire
Insurance Co.:
Special Circulars Nos. 41 and 43.
Report for the year 1891.
Report of Fires.
Report of Property insured. | From Massachusetts Institute of Technology.
Annual Report of President and Treasurer, 1891.
Annual Catalogue. |
| From British Association for the Advance-
ment of Science:
Twenty-four bound volumes of reports. | From Massachusetts Board of Railroad Com-
missioners:
Twenty-third Annual Report, January,
1892. |
| From Building Trades' Club, N. Y.:
Sixth Annual Convention of the National
Association of Builders, January 18th,
1892. | From Ohio State University, Columbus, Ohio:
Catalogue for 1891-92. |
| From Canadian Society of Civil Engineers:
Charter, By-Laws and List of Members.
Proceedings of Annual Meeting, January
12th, 1892. | From A. Raddi, C. E., Spezia, Italy:
I Combustibili Fossili Italiani. Esper-
ienze con la Lignite a Spezia. |
| From Engineering Association, New South
Wales:
Proceedings, Vol. V, 1889-90. | From Palmer C. Ricketts, C. E., Troy, N. Y.:
Second Annual Report of the Public Im-
provement Commission of the City of
Troy, February 1st, 1892. |
| From R. Feret, Chef du Laboratoire, Bou-
logne, France:
Note sur les Mortiers et Betons de
Ciment.
Note sur Diverses Experiences concer-
nant les Ciments. | From Simon Stevens, C. E., N. Y.:
Map of Harlem River and Spuyten Duyvil
Creek, from Ward's Island to the Hud-
son River.
Harlem Ship Canal. |
| From P. J. Flynn, C. E., Los Angeles, Cal.:
Irrigation Canals and other Irrigation
Works. | From Société des Ingénieurs Civils, Paris:
Annuaire de 1892. |
| From F. W. D. Holbrook, Seattle, Wash :
Municipal Reports of Seattle for 1891. | From C. H. Tompkins, Jr., C. E., N. Y.:
Report of the Special Committee of the
U. S. Senate on the Irrigation and Recla-
mation of Arid Lands. 6 Vols.
Progress Report on Irrigation in the
United States. 2 Vols. |

- Memorandum of Data relating to Value of Irrigated Lands and Prices of Water Rights.
- From U. S. Bureau of Education:
Annual Report of the Commissioner of Education, 1888-89. 2 Vols.
- From U. S. Department of State:
Reports from Consuls, Nos. 134-137. November, 1891, to February, 1892.
Special Consular Reports. India Rubber.
- From U. S. Geological Survey:
United States Contour Map.
Seventeen Maps, U. S. Geological Survey.
- From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean. March, 1892.
- From U. S. Naval Observatory:
Washington Observations, 1887.
- Appendix 1. Magnetic Observatories of Europe.
2. Magnetic Observations, 1890.
 3. Meteorological Observations, 1833-87.
- From U. S. Treasury Department:
Commerce and Navigation of the United States, 1891.
- From U. S. War Department, Chief of Engineers:
Annual Report of the Chief of Engineers, 1891. 6 vols.
Report in relation to the Improvement of the Navigation of the Hudson River.
On the examinations and Surveys of Yazoo River, Columbia River, Cypress Bayou, Texas; Penobscot River, Kennebec River, Lower Willamette and Columbia Rivers, Harbor of Refuge near the mouth of Delaware Bay.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—April, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

APRIL 6th, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected—as Members: Elbridge Harlow Beckler, Helena, Mont.; Edward Mohun, Victoria, B. C.; Sam Tomlinson, Bombay, India. As Associate Members: John Stuart Elliott, New York City; William Chauncey Hawley (elected Junior October 1st, 1890), Chicago, Ill.; Walter Gill Kirkpatrick, Nashville, Tenn.; Edwin Mitchell (elected Junior September 7th, 1887), Chambersburg, Pa.; Walter Frank Whittemore (elected Junior March 6th, 1889), Hoboken, N. J.

The death of John H. Morton, M. Am. Soc. C. E., on February 8th, 1892, was announced by the Secretary.

A paper by Willard Beahan, M. Am. Soc. C. E., on "The Intercepting Sewer in Brooklyn, N. Y.," was read by the author and discussed by Messrs. Alfred F. Sears, A. Fteley, D. E. Moran, J. James R. Croes, A. McC. Parker, O. F. Nichols and Charles B. Brush.

APRIL ²⁰8th, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary.

The death of Arthur H. Wood, Jun. Am. Soc. C. E., on April 2d, 1892, was announced.

The report of the Committee "On Uniform Methods of Testing Materials used in Metallic Structures, and on Requirements for these Materials to Further Improve the Grade of such Structures," which

was presented at the Annual Meeting, was discussed by Messrs. H. B. Seaman, L. L. Buck, George S. Morison, James G. Dagron, George H. Blakeley, Gus. C. Henning, H. D. Bush and Charles E. Billin.

OF THE BOARD OF DIRECTION.

APRIL 5th, 1892.—The time and place for the Annual Convention were considered. It was decided that the Convention be held at Fortress Monroe, Va., beginning June 8th, 1892. A Committee was appointed to take charge of the details. Financial business was transacted. Appropriations for the Second Quarter of 1892 were made and approved. Mr. Charles Warren Hunt, M. Am. Soc. C. E., was elected Assistant Secretary. The Publication Committee, through its chairman, presented the following report, which was adopted:

The Committee on Publication, to whom was referred the question of the form in which the publications of the Society shall hereafter be issued, respectfully reports as follows:

First.—It recommends that the *Transactions* and *Proceedings* be printed in the same form as at present, containing essentially the same matter.

Second.—That a new semi-monthly be issued, to be entitled "The Bulletin of the American Society of Civil Engineers." This is to be sent out about five days in advance of each of the regular monthly meetings, and to contain all announcements and other matter now printed in circulars, together with brief abstracts of the papers to be read at the next following meeting.

Third.—The "Bulletin" shall be printed in page form of uniform size with the *Transactions*.

Fourth.—It shall contain notices of all meetings and other notices to be sent out.

Fifth.—The Blue List and Ballot List shall be sent out as they are now.

Mr. Alfred E. Hunt, M. Am. Soc. C. E., was appointed Alternate Delegate to the World's Fair Congress, to fill the vacancy caused by the death of Col. William E. Merrill.

The subject of the Society taking charge of the Section of Civil Engineering at the World's Congress Auxiliary was discussed. The resignation of Mr. Fred. Brooks, M. Am. Soc. C. E., as a member of the Committee on Standard Time was presented and accepted. Applications were considered.

The following were declared elected—As Honorary Member: James Bieheno Francis, Lowell, Mass. As Associate: Francis Hopkinson Smith, New York City. As Juniors: Charles Worthington Comstock, Ithaca, N. Y.; John Fletcher Fairchild, Mount Vernon, N. Y.; Conrad Hewitt, New York City; Henry Stilson Farquhar, Baltimore, Md.; Howard Crathorne Phillips, New York City; Frederic Vernon Pitney, Morristown, N. J.; Charles William Schrage Wilson, New Rochelle, N. Y.

MEMOIRS OF DECEASED MEMBERS.

THOMAS JEFFERSON WHITMAN, M. Am. Soc. C. E.*

DIED NOVEMBER 25TH, 1890.

Thomas Jefferson Whitman was born in Brooklyn, N. Y., July 18th, 1833. His father, Walter Whitman, was of English stock, and was at first a farmer at West Hills, Long Island. His mother, Louisa Van Velsor, was of Dutch descent. In 1822 or 1823 he moved with his family to Brooklyn and took up the occupation of carpenter. Very soon after he built a house on Tillary street near Adams, and moved into it with his family. Thomas, or "Jeff," as his nearest friends called him, was the eighth in a family of nine children. The second child, Walt. Whitman, the poet, was born May 31st, 1819, in the old farm house at West Hills. Speaking of his younger brother after his death, the elder says: "When Jeff was born I was in my fifteenth year and had much care of him for many years afterward, and he did not separate from me. He was a very handsome, healthy, affectionate, smart child, and would sit on my lap or hang on my neck half an hour at a time. As he grew a big boy, he liked outdoor and water sports, especially boating. We would often go down in summer to Peconic Bay, east of Long Island, and over to Shelter Island. I loved long rambles, and he carried his fowling piece."

After such education as could be obtained in the public schools, he learned the printer's trade, the same as that of his elder brother. In 1848, when Jeff was fifteen years of age, the two brothers went off on a leisurely journey and working expedition, through all the middle States and down the Ohio and Mississippi rivers. After living and working for a while in New Orleans, they returned northward up the Mississippi and the Missouri, thence by way of the great lakes to Niagara Falls, Lower Canada, and finally through Central New York and down the Hudson back to their home.

Soon after his return from this long wandering, about 1852, he found more congenial employment in land surveying, and was for some time in the service of an engineer and surveyor by the name of Bartlett. His next employment was in the engineering department of the

* Memoir prepared by Mr. Robert Moore, M. Am. Soc. C. E., and Col. Henry Flad, Past President Am. Soc. C. E.

Brooklyn Water Works, of which Mr. James P. Kirkwood was the Chief Engineer. The date of his entry upon this service appears to have been 1856, though it may not have been until 1857. After the completion of the works, about 1861, Mr. Kirkwood was succeeded by his first assistant, Mr. Moses Lane, the water and sewer departments being then consolidated into one. Mr. Whitman remained with Mr. Lane, ranking after 1863 as Chief Assistant Engineer.

Four years later, in 1867, upon the recommendation of Mr. Kirkwood, Mr. Whitman was chosen his successor as Chief Engineer of the Board of Water Commissioners of St. Louis, Mr. Kirkwood remaining for a time as Consulting Engineer. Mr. Whitman assumed charge of the St. Louis Water Works in May, 1867, and remained continuously in charge, first as Chief Engineer, and then as Water Commissioner, for twenty years, retiring in June, 1887. Under his supervision the present system of water works at St. Louis was constructed and the general features of the extension thereof now in progress designed. He had also a large consulting practice in connection with water works in the West and Southwest, to which, after 1887, his time was exclusively devoted. In 1888-89 he was employed by the City of Milwaukee to devise plans for the final disposal of the sewage and for the improvement of the water supply of that city, in which work he was assisted by the City Engineer, Mr. G. H. Benzenberg, M. Am. Soc. C. E., and by his old friends Mr. Joseph P. Davis, M. Am. Soc. C. E., and Colonel Henry Flad, Past President Am. Soc. C. E. This work occupied a large part of his time during two years, and the report of the Commission, published in 1889, is a clear and cogent statement of what is without doubt the final solution of these most difficult and important problems. A list of other cities which he served as Consulting Engineer would include Chicago, Milwaukee, Minneapolis, St. Joseph, Kansas City, Leavenworth, Little Rock, Galveston and Memphis. At the time of his death he had charge of a new pumping plant in the latter city, the supply being taken from artesian wells.

Mr. Whitman was married in 1859 to Martha E. Mitchell, who died in St. Louis in 1873, leaving two daughters, of whom the elder, Manahatta, died in 1886. His own death occurred in St. Louis, November 25th, 1890, after a brief illness, in the fifty-eighth year of his age.

Mr. Whitman was a member of the American Society of Civil Engineers from January 29th, 1868, until his death, and was always deeply interested in the welfare of the Society. For the year ending January 20th, 1886, he was Vice-President.

Mr. Whitman was an engineer of the soundest judgment and a man of the highest integrity. And never was there a more genial companion or a more devoted and loyal friend.

JOHN HENRY MORTON, M. Am. Soc. C. E.*

DIED FEBRUARY 8TH, 1892.

John Henry Morton was born in Conneaut, Ashtabula County, Ohio, May 27th, 1847, and was the son of one of the prominent engineers of Ohio, from whom he inherited many of the qualities which afterwards made him successful in his chosen profession.

His first engineering experience was gained in 1868, when he was twenty-one years old, in the employ of the Lake Shore and Michigan Southern Railway as assistant to the Division Engineer in charge of the Oil City Extension.

In 1869 he was appointed Assistant Engineer on the Missouri, Kansas and Texas Railway, in which position he remained until 1872, when he was appointed to a similar position on the Texas and Pacific Railway.

During the years 1873-76 he served successively as Assistant Engineer of the New Orleans, Baton Rouge and Shreveport Railroad, as Assistant City Engineer, Sandusky, Ohio; and as Assistant Engineer of the Scioto Valley Railway, Ohio.

In 1877 he was called to Covington, Kentucky, where he was employed as Assistant Engineer in the construction of the City Water Works.

In the Summer of 1878 he removed to Denver, Colorado, and, soon after his arrival, was engaged by the Denver and Rio Grande Railway as Locating Engineer. He served in this capacity until 1884. During his service of seven years with this road some of its most important parts were located and built.

From 1886 to 1891 he was engaged in the location and construction of the following named roads: Minnesota and Northwestern, Glenwood Springs Extension of the Denver and Rio Grande; Seattle, Lake Shore and Eastern; Rifle Creek Extension of Denver and Rio Grande, and Rio Grande Western.

At the time of his death, February 8th, 1892, he held the position of Locating Engineer on the Rio Grande Western Railway.

In all the various positions held by Mr. Morton during his professional career of twenty-four years, his exceptional ability as an engineer was clearly shown, and in many of them his judgment as an arbitrator was called into requisition. This latter was especially the case in the controversy between the Rio Grande Southern and its contractors, where his judgment was sought and his decision accepted

*Committee to prepare Memoir: M. H. Rogers, M. Am. Soc. C. E.

by both parties. The reference to him of a controversy involving great pecuniary interests was a compliment of the highest character.

In the death of Mr. Morton, the profession loses a member of wide experience and of acknowledged ability and integrity.

He became a Member of the American Society of Civil Engineers June 3d, 1891.

ARTHUR HASTINGS WOOD, Junior Am. Soc. C. E.*

DIED APRIL 2D, 1892.

Arthur Hastings Wood was born at Chicago, July 29th, 1869, but the greater part of his childhood was spent in Quincy, Illinois, and Topeka, Kansas, the present home of the family. At the age of fourteen, having made an honorable record in the public schools at Topeka, he entered the Vermont Episcopal Institute at Burlington, Vermont, where, as a Rock Point Cadet, he was distinguished for those habits of industry, perseverance, devotion to duty and honorable conduct which so marked his character throughout his life. At the close of his second school year he had won a place in the highest rank, the Order of the Exempt, and held the military rank of Sergeant. At his earnest solicitation he left school at the end of his third year, after the death of his father, that he might begin to earn his own living, and from this time to the day of his death his manly course was a source of pride and satisfaction to his friends.

In these six short years he had not only wholly provided himself with pecuniary support, but had been able to lay aside something from his modest salary, at the same time that he furnished himself with ample means of recreation and improvement, and was obliged to expend considerable sums in the purchase of expensive instruments for use in his profession.

His mathematical proficiency and personal inclination led him to choose the career mapped out by his teachers, who have watched him with great interest.

In the summer of 1886 he was attached to the Construction Department of the A. T. & S. F. R. R. Co., as a member of Mr. Rowe's corps (now Resident Engineer at Albuquerque), and was actively engaged in southeastern Kansas until near the following spring, when he was offered the position of rodman under G. M. Walker, Jr., on the Chicago, Kansas and Western Railroad Extension in the southwestern part of the State. Mr. Rowe said of him, "I hate to give him up; he

*Committee to prepare memoir: James D. Schuyler, M. Am. Soc. C. E., and F. E. Prendergast, M. Am. Soc. C. E.

is, without exception, the best and most thoroughly competent boy I ever took out."

This testimony was confirmed by Mr. Walker. At the completion of this work he came direct to California early in August, 1887, to enter Mr. Schuyler's service, working on the Sweetwater dam until its completion, and surveying the lands of the San Diego Land and Town Company.

In 1891 he was elected a Junior of the American Society of Civil Engineers, and up to the short illness that preceded his death he was still in the employ of the Land and Town Company.

During his brief residence in California his upright character and gentle disposition had won the regard of all who knew him.

NOTES AND MEMORANDA.

At the meeting of the Society held April 20th, R. L. Harris, M. Am. Soc. C. E., announced that he "can construct in quicksand, sands, and in many of the fine earth materials (largely of the material itself), floors, walls, monoliths, etc., of desired shape, at any reasonable depth below the surface and water level, with but slight disturbance of the surface." Samples were shown of quicksand which had been thus hardened.

Mr. GEORGE DOWNE, M. Am. Soc. C. E., writes from Randwick, in Australia, as follows:

"Our steam tramway system is now about the largest worked by steam motors. We have an average of 61 in steam daily. All in traffic were made by the Baldwin Locomotive Works, from whom we have just received fifteen, with 11 x 16 inch cylinders and 3-foot wheels. We average about 2 700 miles each month per motor in steam, some doing 130 miles per day; and this through crowded and muddy streets, is not a bad record for 3-foot wheels. Last year we were able to pay a dividend of $5\frac{7}{10}\frac{1}{10}$ per cent."

MAY 20th, 1892.

To the Engineering and Technical Press and to the Members of American Society of Civil Engineers:

Owing to the fact that the printed notice at the top of the "Advance" copies of papers has been misunderstood or disregarded, to such an extent, that the papers of the Society are often printed practically in full, before they appear in the *Transactions* of the Society, the Committee on Publications has adopted the following rule:

Abstracts of papers will be published, as far as practicable in the *Bulletin*, and generally in advance of the time they are to be read.

Such abstracts may be republished immediately, but no other publication of the papers in advance of their appearance in the *Transactions* will be permitted, without the written approval of the Secretary. This applies to discussions as well as to the papers themselves.

The propriety of these requirements will be obvious to all. Advance copies are subject to correction, and are often liable to considerable alteration.

The Society must withhold papers from publication for a reasonable time to secure a thorough discussion; the publication of which, with a paper, greatly increases its value. Premature publication is unjust to the author and unfair to the Society.

No paper will be published in the *Transactions* which has been previously published elsewhere; and the Society owes it to itself and to its members to guarantee that originality of publication which it demands from them.

The Publication Committee will insist upon rigid adherence to this rule, the only alternative to which would be the abandonment of the issuance of "Advance Copies," the publication of which has heretofore been very satisfactory, excepting in this particular.

LIST OF MEMBERS.

ADDITIONS.

HONORARY MEMBER.

	Date of Election.
FRANCIS, JAMES BICHENO.....(<i>Past President.</i>)	
Consulting Engineer, Proprietors of Locks and Canals on Merrimack River, Lowell, Mass.....	
	M. Nov. 5, 1852
	Hon. M. Apr. 5, 1892

MEMBERS.

BECKLER, ELBRIDGE HARLOW...	Chief Engineer, Pacific Extension St. P., M. & M. Ry., Helena, Mont	Apr. 6, 1892
MOHUN, EDWARD.....	City Hall, Victoria, B. C.....	Apr. 6, 1892
WATKINS, RICHARD.....	466 Castlereagh st., Prince Alfred Park, Sydney, N. S. W., Australia.....	Dec. 3, 1890
SWAIN, GEORGE FILLMORE.....	Massachusetts } Inst. of Technology, Boston, } Mass.....	Assoc. Sept. 5, 1883 M. Mar. 2, 1892

ASSOCIATE MEMBERS.

BARNEY, ¹ / ₂ SAMUEL EBEN, JR.....	Instructor Civil Engineering, Yale University, 346 Whitney ave., New Haven, Conn.....	J. June 2, 1886 Assoc. M. Feb. 3, 1892
EARL, GEORGE GOODELL.....	P. O. Box 70, Americus, Ga..	J. May 7, 1890 Assoc. M. Dec. 2, 1891
EWING, ¹ / ₂ WILLIAM BION.....	4136 Ellis ave., Chicago, Ill....	J. Apr. 3, 1889 Assoc. M. Feb. 3, 1892
GODDARD, LESLIE WARREN.....	U. S. Engineer Office, Grand Rapids, Mich.....	Mar. 2, 1892
MITCHELL, EDWIN.....	Assistant Engi- neer, Cumber- land Valley R. R., Cham- bersburg, Pa..	J. Sept. 7, 1887 Assoc. M. Apr. 6, 1892
ROBERTS, NATHANIEL.....	73 Prescott place, Jersey City, N. J.....	Nov. 4, 1891

ASSOCIATE.

SMITH, FRANCIS HOPKINSON.....	16 Exchange place, New York City.....	Apr. 5, 1892
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JUNIORS.

COMSTOCK, CHARLES WORTHING- TON.....	9 East Buffalo st., Ithaca, N. Y.	Apr. 5, 1892
FAIRCHILD, JOHN FLETCHER....	11 E. First st., Mt. Vernon, N. Y.....	Apr. 5, 1892
FARQUHAR, HENRY STILSON.....	210 E. Lexington st., Balti- more, Md.....	Apr. 5, 1892
PHILLIPS, HOWARD CRATHORNE..	Assistant Engineer, New York and Northern Ry., Yonkers, N. Y.....	Apr. 5, 1892
PITNEY, FREDERIC VERNON.....	Morristown, N. J.....	Apr. 5, 1892
SELL, WILLIAM DRUMM.....	Logan C. H., W. Va.....	Dec. 3, 1891
USINA, DOMINGO ANTHONY.....	78 Bolton st., Savannah, Ga..	Mar. 1, 1892
WILSON, CHARLES WILLIAM SCHRAGE.....	New Rochelle, N. Y.....	Apr. 5, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

BONZANO, M. F.	Gen. Supt. Philadelphia and Reading R. R., 227 S. Fourth st., Philadelphia, Pa.
BURPEE, MOSES.....	Chief Engineer Bangor and Aroostook R. R. Houlton, Me.

CALKINS, FRANK A.	Idaho Falls, Idaho.
CORTHELL, E. L.	Room 800, The Temple, Chicago, Ill.
DAVIS, CHESTER B.	1627 Monadnock Bldg., Chicago, Ill.
DEVIN, GEORGE.	Chief Engineer Pottsville Bridge Co., Pottsville, Pa.
DUNLAP, D. C.	905 Chamber of Commerce Bldg., Chicago, Ill.
FORCE, C. G.	Chief Engineer Dept. Public Works, Cleveland, Ohio.
FRANCIS, GEORGE B.	Resident Engineer N. Y., P. and B. and O. C. R. R. Terminal Co., Providence, R. I.
GATES, C. L.	Engineer Toledo Bridge Co., Toledo, Ohio.
HARDING, HENRY	Hartland Four Corners, Vt.
HUNT, ALFRED E.	President Pittsburgh Reduction Co., 116 Water st., Pittsburg, Pa.
HUNT, CHARLES WARREN.	(Assistant Secretary.) 127 East 23d st., New York City.
KELLY, JOHN P.	2637 Fifth ave., Troy, N. Y.
KENDRICK, JOHN W.	Chief Engineer N. P. R. R., Grand Central Passenger Station, Chicago, Ill.
LEDERLE, GEORGE A.	401 Roe Bldg., St. Louis, Mo.
MASON, S. D.	Principal Asst. Engineer N. P. R. R., Grand Central Passenger Station, Chicago, Ill.
McCOOL, DANIEL.	(Care C. L. W. Eidlitz), 160 Fifth ave., New York City.
NICOLLS, WILLIAM J.	420 Walnut st., Philadelphia, Pa.
NOYES, ELLIS B.	Lewiston, Pa.
O'ROURKE, JOHN F.	(Care Rapid Transit Commission), 22 William st., New York City.
PARKHURST, HENRY W.	Assistant Engineer Illinois Central R. R., 58 Michigan ave., Chicago, Ill.
PATTERSON, J. C.	1919 Spruce st., Philadelphia, Pa.
SEARLES, WILLIAM H.	5 Euclid ave., Cleveland, Ohio.
STOWELL, CHARLES F.	25 North Pearl st., Albany, N. Y.
WEGMANN, EDWARD, JR.	Englewood, N. J.
WELLMAN, DAVID W.	Los Gatos, Cal.

ASSOCIATE MEMBERS.

CLAPP, GEORGE H.	116 Water st., Pittsburg, Pa.
CUNNINGHAM, A. C.	Mohawk, N. Y.
SMITH, ALBERT.	Saltsburg, Pa.
THOMSON, THOS. KENNARD.	503 Lake st., Elmira, N. Y.

ASSOCIATE.

KARNER, WILLIAM J.	The Temple, Chicago, Ill.
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JUNIORS.

COLE, GEORGE W.....	Ft. Riley, Kans.
CUMMINGS, R. A.....	Asst. Engineer in Charge Terminal Facilities N. and W. R. R., 67 State st., Columbus, Ohio.
FERGUSON, WILLIAM L.....	(Care P. R. R.), Ebensburg, Pa.
FOLWELL, A. P.....	Hornellsville, N. Y.
HAWLEY, WILLIAM CHAUNCEY...	1527 Monadnock Bldg., Chicago, Ill.
HORTON, SANDFORD	(Care The Southwestern Co.), St. Charles, Mo.
KIBBE, AUG. S.....	Box 405, Paterson, N. J.
MCGUIRE, JOHN C	Ellicott City, Md.
ROEHM, GEORGE E.....	Lock Box 594, Watwatos, Wis.
ROGERS, W. A.....	Asst. Engineer C. M. and St. P. Ry., Chicago, Ill.
TSUJI, TARO.....	24 Hongo Umicho Nichome, Tokio, Japan.
TYRRELL, HENRY G	Pottsville, Pa.

DEATH.

WOOD, ARTHUR H.....	Elected Junior, March 31, 1891; died April 2, 1892.
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DROPPED.

MEMBER.

CORNELL, O. H. P.....	Date of Action of Board. April 5, 1892
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ADDITIONS TO LIBRARY AND MUSEUM.

From American Institute of Mining Engineers, N. Y.:

A Hand-Telescope for Stadia Work.
A List of Minerals Containing at Least
One per cent. of Phosphoric Acid.
Centrifugal Ventilators.
Coals and Coke of Eastern Kentucky.
Contribution to the Early History of the
Industry of Phosphate of Lime in the
United States.
Extraction of Ore from Wide Veins or
Masses.
Fluorspar Deposits of Southern Illinois.
Laurentian Low-Grade Phosphate Ores.
La Gardette; The History of a French
Gold Mine.
Photographic and Co-ordinate Surveying.

Proceedings of Sixty-first Meeting, Baltimore, Md., February, 1892.

Tests and Requirements of Structural
Wrought Iron and Steel.

The Desilverization of Lead-Slags.

Zinc-Blende Mines and Mining near
Webb City, Mo.

From Board of Railroad Commissioners, Albany, N. Y.:

Ninth Annual Report for 1891, Vol. 2.

From R. C. Bacot, Jersey City, N. J.:

Annual Report of the Riparian Commissioners of the State of New Jersey for
1891.

From Boston Public Library, Boston, Mass.:
Bulletin for April, 1892.

From W. T. Comstock, N. Y.:
Building, Vol. IV, No 5, January 30, 1886.

- From Col. Wm. P. Craighill, U. S. A., Baltimore, Md.:
Journal of the United States Artillery, Vol. I, No. 1.
- From Director-General of Railways, Calcutta, India:
Administration Report of the Railways of India, 1890-91.
- From E. T. Dumble, State Geologist, Austin, Texas:
First and Second Annual Reports of Geological Survey of Texas.
First Report of Progress.
Bulletin No. 4.
Geology of Western Texas.
Report on the Utilization of Lignite.
- From Engineers' Society of Western Pennsylvania:
Discharge Observations of Large Streams. Meeting of the Chemical Section.
- From M. T. Endicott, U. S. Navy Dept., Wash.:
Specifications for a Dry Dock for the United States Government at Puget Sound Naval Station.
U. S. Patent for a Dry Dock.
- From Chas. W. Gay, City Engr., Lynn, Mass.:
Annual Report of the City Engineer of the City of Lynn, for the year ending December 31, 1891.
- From Institution of Civil Engineers, London, Eng.:
List of Members, April 1, 1892.
- From Massachusetts Board of Railroad Commissioners:
Railroad Commissioners' Report, September, 1891.
- From E. D. Meier, C. E., St. Louis, Mo.:
Report of the Special Committee on Prevention of Smoke.
- From Mining Institute of Scotland:
Transactions of Meeting of March 9, 1892.
- From North of England Institute of Mining and Mechanical Engineers:
Transactions, Vol. XLI, Part 1.
- From Pennsylvania Railroad Co.:
Forty-fifth Annual Report for the year 1891.
- From Philosophical Society of Glasgow:
Proceedings, 1890-91.
- From Amerigo Raddi, C. E., Spezia, Italy:
Sull' Importanza dei Moderni Studi Rilevanti l'Ingegneria Sanitaria.
Sui Danni Causati dai Cavi Conduttori Elettrici.
- From H. H. Remfry, Calcutta, India:
Inventions Likely to "Take" and "Pay" in India.
- From Addison M. Scott, C. E., Charleston, W. Va.:
Coal Commerce and Development in the Great Kanawha Valley.
Annual Report of the Chief of Engineers on the Improvement of the Great Kanawha River, etc.
- From Seismological Society of Japan:
Transactions, Vol. XVI.
- From Cæsius C. Smith, Denver, Col.:
Utah. A Peep into a Mountain-Walled Treasury of the Gods.
- From Hamilton Smith, Jr., London, Eng.:
Report of the Superintendent of the El Callao Mining Co. for year ending December 31, 1891.
- From Gen Wm. Sooy Smith, Chicago, Ill.:
The Sooy Smith System of Building Construction for Chicago.
- From E. H. Stone, Sect'y, Simla, India:
Proceedings of the Committee of Locomotive and Carriage Superintendents for India. Second meeting at Bombay, December, 1890.
- From Society of Engineers and Architects, Palermo, Italy:
Studio Preliminare a Programma di Progetti di un Canale Internatitino Venezia-Spezia.
Tavole Illustrative dello Studio Preliminare Atti del Congresso degli Ingegneri e degli Architetti in Palermo nel 1892.
- From Capt. Thos W. Symons, Portland, Oregon:
Annual Report upon the Improvement of Certain Rivers and Harbors in Oregon and Washington.
- From the Engineering Record:
Road Construction and Maintenance.
- From U. S. Department of State:
Consular Reports, No. 138, March, 1892.
- From U. S. War Department, Chief of Engineers:
Quarterly Statement Stations of Officers, Specifications. Removal of Wreck of the Schooners Edith T. Gandy and Florence Newell; Repairs to Storehouse, Fort Monroe, Va.; Furnishing Valves for St. Mary's Falls Canal; Improvement of Grand Haven Harbor, Mich.; Kennebec River, Me., and Illinois River; Dredging in Port Jefferson Inlet, N. Y.; Waukegan Harbor, Ill.; Green Bay, Wis.
Report on the Improvement to the Entrance of Yaquina Bay, Oregon; Effect of Backwater from the Mississippi River; Examination and Survey of Red River of the North; of Electrical Commission Appointed to Consider the Location, Arrangement and Operation of Electrical Wires in the District of Columbia.
Memorial in Favor of the Improvement of the Navigation of the Mississippi River; Statement of Amount that can be Profitably Expended during the Fiscal Year 1893 for Investigating Mining Débris in California.
- From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, April, 1892.
- From C. J. H. Woodbury, Boston, Mass.:
Oxford Club Souvenir, Lynn, Mass.
- From World's Columbian Exposition, Chicago, Ill.:
Classification and Rules, Department of Machinery, Mines, Mining, etc.; Electricity; Horticulture; Liberal Arts; Transportation Exhibits; Manufactures; Machinery; Information for foreign exhibitors; Miscellaneous Notes and Information.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—May, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to members.)

OF THE SOCIETY.

MAY 4TH, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected. As Members: Charles Francis, Davenport, Iowa; Michael Lehané Lynch, Ft. Worth, Texas; Otto von Geldern, San Francisco, Cal.; Morgan Edward Yeatman, Roanoke, Va. As Associate Members: William Anderson Aycrigg, Wilmington, Del.; Robert Augustus Cummings (elected Junior, October 1, 1890), Roanoke, Va.; Frans Engström, Pittsburgh, Pa.; Janon Fisher, Baltimore, Md.; Louis Focht, Bethlehem, Pa.; Alvah Seymour Going, Victoria, B. C.; John Edward Hill, Ithaca, N. Y.; John Jay Lafayette Houston, Altoona, Pa.; James Madison Porter, Easton, Pa.; Joseph Strachan, Brooklyn, N. Y.; Walter Loring Webb, Ithaca, N. Y.; Harry Roberts Wheeler (elected Junior, April 4, 1888), Walton, N. Y.

A paper on the "Hydrography of the Potomac Basin," by C. C. Babb, Jun. Am. Soc. C. E., was read, and the subject was discussed by Mr. James Owen.

A paper by H. F. Dunham, M. Am. Soc. C. E., on "A New Method of Tunnel Alignment," was read by the author, and discussed by Messrs. R. B. Stanton, O. F. Nichols, J. F. O'Rourke, J. F. Crowell, E. P. North, A. McC. Parker, T. H. McCann, F. Collingwood and H. F. Dunham.

MAY 18TH, 1892.—The Society met at 20 o'clock, Vice-President Brush in the chair; Charles Warren Hunt, Assistant Secretary. The death of Past President Wm. P. Shinn, on May 5th, 1892, was announced, and appropriate remarks were made by Vice-President Brush.

An invitation was extended to the members of the Society to attend the meetings of the American Water Works Association then in session in this city.

The Society by vote extended an invitation to members of that body to make use of the rooms of the Society during their stay in the city.

A paper by W. W. Maclay, M. Am. Soc. C. E., on "Hot Tests for Determining Change of Volume in Portland Cement," was read, and the subject discussed by Messrs. R. W. Lesley, J. M. Diven, J. J. R. Croes, W. H. Grant and C. B. Comstock.

OF THE BOARD OF DIRECTION.

MAY 3D, 1892.—A committee of three was appointed to confer with similar committees from the three other National Engineering Societies, on the subject of a general welcome to all visiting foreign engineers at the time of the Chicago Exposition.

The Board voted to accept the "organization and management" of Division A, Civil Engineering, of the World's Congress Auxiliary, the charge of which was assigned to the Society by the Executive Committee.

A committee was appointed in accordance with the suggestion of Past President Whittemore, to prepare "a suitable memorial to be tendered to the family of the late Sir John Coode, Past President of the Institution of Civil Engineers, as a mark of appreciation of his courtesy to the members of this Society who visited England in 1889."

Prof. Cady Staley was authorized to represent this Society at the Congress of Internal Navigation soon to be held in Paris.

The Secretary was ordered to issue ballots to members as to their choice of a Nominating Committee in accordance with the resolution passed at the last Annual Convention.

The following were elected. As Associate: Clarence Boyd Marriott, Baltimore, Md. As Juniors: Louis Blake Bonnett, Elizabeth, N. J.; Oscar Lowinson, New York City; Wisner Bell Martin, Jersey City, N. J.; Liberty Gilbert Montony, New York City; Walter Howe Polk, Vicksburg, Miss.; Julius Prince, Poughkeepsie, N. Y.; William Burnett Yereance, South Orange, N. J.

MEMOIRS OF DECEASED MEMBERS.

WILLIAM JARVIS McALPINE, Hon. M. Am. Soc. C. E.*

DIED FEBRUARY 16TH, 1890.

Donald McAlpine, grandfather of the subject of this memoir, who traced his descent in direct line from the Scottish kings of Clan Alpine, was a lieutenant in the 42d Highlanders, the Black Watch, and later exchanged into the 60th. He was wounded in the assault upon Quebec by Wolfe, and during the war of the Revolution was a captain in the Queen's Rangers. During this time he married Elizabeth Storer, of Beaufort, South Carolina, where his son John was born in 1783.

John was a millwright and mechanical engineer. He built many mills in New York and elsewhere, and as far south as Richmond and Petersburg, Virginia. In 1824 he was employed by the Delaware and Hudson Canal Company, in charge of the construction of the machinery of the inclined planes at Carbondale, under John B. Jervis, Chief Engineer of the Company. His wife was Elizabeth Jarvis, of New York, a granddaughter of Bishop Jarvis, of Connecticut, and a direct descendant of Admiral Jarvis, Lord St. Vincent, and to them in North Moore Street, New York City, on April 30th, 1812, was born William Jarvis McAlpine.

William was educated at a private school in Newburgh, at the Newburgh Academy and at a boarding school in Rome, N. Y. During this period, his father, who wished that his oldest son should continue his business, took him from time to time to visit the works in process of erection by him, accompanying the examinations with personal instruction.

In 1827, when but little more than fifteen years of age, Mr. McAlpine commenced his preparation for the profession of civil engineer, as a pupil of John B. Jervis, on the Carbondale Railway in Pennsylvania. John B. Mills was resident engineer, and James Seymour in charge of the party in which he was a rodman. On the adjacent division James Archbold was resident, and J. W. Crane assistant engineer. On the canal were Russell Lord, John T. Clark, P. R. Root and James McEntee, with Horatio Allen as resident engineer.

In 1830-31 he was assistant engineer with Mr. Jervis on the Mohawk and Hudson River Railroad, and the Schenectady and Saratoga Railway. The following year he was in the employ of the St. Lawrence Improvement Company, but in 1833-34 he was again with Mr. Jervis on the

* Committee to prepare Memoir, Wm. R. Hutton, M. Am. Soc. C. E.

Chenango Canal as resident engineer and in charge of the office. He made at this time a complete examination of the rainfall and outflow of Eaton and Madison Brooks, the results of which are of recognized authority. (See letter of Mr. Jervis.)

In 1835-36 Mr. McAlpine had charge of the survey and estimates for the enlargement of the Erie Canal from Little Falls to Albany, involving many and important changes of location.

When Mr. Jervis resigned as Chief Engineer of the Eastern Division of the Erie Canal enlargement, Mr. McAlpine, then only twenty-four years of age, was appointed his successor. He remained in this position during the construction of the works and until 1844. In 1845 he was made Chief Engineer of the dry dock at the Brooklyn Navy Yard—a work of great magnitude and extraordinary difficulty. The foundations, 40 feet below tide level, were upon quicksand of great depth, disturbed by numerous springs of fresh water having their sources higher than the surface of the river. His careful study of the conditions, and his skill, resource and success in overcoming obstacles, gave a great impulse to his reputation. He remained in charge until October, 1849, leaving the work before it was completed, but after all the engineering difficulties had been overcome.

In 1850 he reported a plan for supplying the city of Albany with water from Patroon's Creek, and the works were constructed under his direction in 1851. In the same year he was requested by the Water Commissioners of Chicago to make surveys and furnish plans for supplying that city with water. His report, made in October of that year, provided for a crib in the lake 600 feet from the shore, from which water was to be drawn through a wrought-iron pipe 30 inches in diameter, laid in a trench 3 feet under the bottom of the lake, and covered with stone. The water, 3 000 000 gallons per day, was to be pumped by a Cornish engine into a tank containing 371 000 gallons. These works were completed by him in 1854. From a remark by Mr. Chesborough, it is inferred that the same pumps were furnishing the supply in 1864, although then found insufficient. At the time the works were designed the population of Chicago was about 35 000, but provision was made for 100 000 at 30 gallons each per day. The present supply is an extension of the original plan; the crib 600 feet from shore is replaced by several important structures two to four miles from the land, and the 30-inch iron pipe by expensive and difficult tunnels under the lake bottom.

In 1850 the Water Commission of Brooklyn invited him to examine and report upon the different sources and plans proposed for the supply of that city. These were (1) a connection with the Croton supply of New York; (2) the Bronx River, now furnishing about 10 000 000 gallons per day to New York City; (3) the lakes on Long Island; (4) wells. After a full discussion and surveys, in October of that

year he recommended the streams on the south side of Long Island, giving his recommendations with great detail, substantially as constructed at a later date.

In 1852 he was selected by United States Commissioner Walworth as his expert adviser to report the facts and make the necessary estimates in the Wheeling bridge case. This was a suit in the Supreme Court of the United States to compel the removal of the suspension bridge over the Ohio at Wheeling, Va., or its reconstruction at a greater height above the water, the *cause célèbre* of its day. In the same year he reported upon a tunnel under the Hudson River at Albany.

In 1852 he was State Engineer of the State of New York, which position he held during the two succeeding years, and in 1855-57 he was a Railroad Commissioner of the State. While in these positions he made thorough reports upon the theoretical and actual cost of transportation by land and water, which were translated into French and German and largely quoted in Europe. He also instituted more complete methods of analysis of railway reports, and classified and published full details of the railways then existing in the State.

In 1856-57 he was also Chief Engineer and Assistant to the President of the Erie Railway, and in 1857 Chief Engineer and Vice-President of the Galena and Chicago (now forming part of the Chicago and Northwestern) Railroad.

Early in 1857 John Childs, William J. McAlpine and James P. Kirkwood were appointed by the Montreal Harbor Commission a Board of Engineers to report a plan for increased harbor accommodation for Montreal. They reported in 1858, recommending Pointe St. Charles as the best site for a harbor, and recommending the enlargement of the Welland Canal. In 1859 he spent two months in Cuba for his health.

In April, 1860, Mr. McAlpine was Chief Engineer of the Third Avenue Bridge over the Harlem River, in the City of New York. The draw pier of this bridge, as designed by him, consisted of a central cylinder of cast iron, 6 feet in diameter, sunk by means of compressed air, and surrounded by ten other similar cylinders.

In 1851 Major Walter Gwynne, Chief Engineer, on the recommendation of Mr. L. J. Fleming, constructed the piers of a bridge over the Pedee River in North Carolina with cast iron cylinders. The work was commenced by the Potts or vacuum process, but a large log having been encountered, compressed air was applied to enable men to enter the cylinder and remove the log, and the work was continued and completed upon that system, and antedated the Rochester bridge in its application to bridge piers. The same method was applied a little later by the same engineers to a bridge over the Santee River in South Carolina. The Harlem River (Third Avenue) Bridge appears to have been the third application of the system in this country.

In sinking the first cylinder, full and complete observations were made to ascertain the friction upon its sides, which Mr. McAlpine concludes reaches half a ton per square foot. When the cylinder had reached its proper depth, 47 feet below the water, although the normal section was sufficient, it was determined to increase the bearing surface of the base. This was done by driving sheet piling under the edges of the cylinder, inclining outward at an angle of 30 degrees, excavating and filling the coned space with concrete.

Mr. McAlpine also designed a caisson for the abutment of this bridge, divided into six air-tight compartments each, with its air locks, pipes, etc. It was in the same year (1860) that the foundations of the piers and abutments of the bridge over the Rhine at Kehl were sunk in rectangular "inverted" caissons, 3 and 4 to a pier, sunk in contact, as a substitute for cylindrical columns, the masonry being laid in a timber caisson on top of the inverted caisson or air chamber. It was found desirable, however, to cut through the walls of the caissons and sink them all together. All progress is gradual, but the Kehl bridge and not that of Rochester is the parent of our present system, all previous work having been done with cylinders. Mr. McAlpine also suggested that the caisson may be constructed of timber, indicating in advance the usual method in America of sinking foundations by compressed air. A paper upon "The Supporting Power of Piles" based upon his numerous observations and experiments at this work, and upon the foundations of the Brooklyn dry dock, won for him the Telford medal of the Institution of Civil Engineers in 1868. In 1861 he became Vice-President and General Superintendent of the Eastern Division of the Ohio and Mississippi Railroad, retaining this position until reorganization in 1864. He was Chief Engineer of a Pacific Railway in 1864-65.

In 1865 Mr. McAlpine designed, and afterwards constructed the New Bedford water works, including the large pumping engine, which were completed in 1869. He visited Europe in the latter part of 1866 and beginning of 1867. He made many friends and received marked attention from the leading members of our profession, and was at this time made a member of the Institution of Civil Engineers. In the latter year he was chairman of a commission of engineers called to examine and report upon the plans for the St. Louis bridge. He also reported upon the Omaha and Harlem River bridges.

In 1868, associated with Mr. Keefer, he was Consulting Engineer for the Clifton Suspension Bridge at Niagara Falls. He was consulted about numerous water works, Oswego, Burlington, Hartford, Rochester, Saratoga, Buffalo, etc.

In 1869 he reported upon plans for the improved water supply of Montreal, and in the same year was engaged as expert in the suits against the State for damages caused by the breaking of a State dam in the Black River, the basis of a paper by him in the *Transactions of the Society on "Waves of Translation in Fresh Water."*

In 1871 he reported a plan for supplying Norfolk with water from Lake Drummond in the Dismal Swamp, by means of a conduit 3 feet in diameter, built of wooden staves, a construction which "can rarely be adopted, and its inception and application are due to the peculiar circumstances of this region of diluvial deposit and geological uplift," otherwise, to its being placed below the permanent subsoil water surface.

In 1873 he was Superintendent of the new Capitol at Albany and constructed its foundations on a doubtful and variable soil, a pure clay with seams of quicksand. This work also was the subject of a paper by him in the *Transactions* of the Society. He was at the same time Consulting Engineer of the Canada Southern Railroad.

In 1873 the whole country was interested in the subject of cheap transportation from the West to the seaboard, chiefly by means of water lines. Mr. McAlpine was engaged by the Oswego Board of Trade to study the subject and to present to the U. S. Senate Committee on Transportation the advantages of the route by the great lakes, the Oswego and Erie Canals (enlarged) and the Hudson River.

In 1870 he was invited by the Danube Navigation Company to examine and report upon the improvement of the Rapids of the Danube at and above the "Iron Gate," which had been under discussion for many years, by the most distinguished engineers of Austria and Hungary. His report made in 1871 shows his usual good, practical judgment, and it is no little compliment that although two later commissions of the most prominent hydraulic engineers of Europe have since reported plans for this improvement, those adopted are upon the general lines of Mr. McAlpine's recommendations. At the time of his death the Danube Steam Navigation Company, to whom the work had been entrusted by the Austro-Hungarian Government, expected to call him to take charge of the work as soon as their arrangements were completed.

In 1874, with Milnor W. Roberts, Julius W. Adams, W. J. Morris and Solomon Roberts, he examined the subject of a new water supply for Philadelphia, and made an elaborate and valuable report.

In 1879-80, as Engineer of the Department of Parks of the City of New York, he constructed the Riverside Drive in this city, and made plans for a bridge over the Harlem River at 181st Street. He was also Chief Engineer of the Staten Island Water Supply Company and designed works for supplying the various towns on the island.

At the request of the Spring Valley Water Company in 1879, he examined and reported upon the plans and works of that Company, and published a short memoir upon the present and future water supply of San Francisco.

In 1879-83 he was Consulting Engineer of the Interoceanic Railway at the Isthmus of Tehuantepec—the site of Captain Ead's proposed

ship railway. He visited the Isthmus in 1880 and again in 1881, and personally examined the line. The project was abandoned after considerable work had been done, by reason of some difficulty with the Government of Mexico.

In 1882 he was in charge of the Ramapo Water Supply—a project for supplementing the Croton with water from the Ramapo Valley, to be delivered in New York at a height sufficient to protect the highest buildings in case of fire. It received for a time the enthusiastic support of the fire underwriters and the dry goods district, but failing to obtain a contract from the city, was abandoned by them for some other scheme, which likewise came to naught. Mr. McAlpine gave to this project much time and study, and the influence of his reputation until his death, hoping to make it the crowning work of his life. It was proposed to use exclusively wrought-iron pipes up to very large dimensions for the main conduit, which would at the time have been their introduction on a large scale east of the Rocky Mountains. This system on a more moderate scale has since been applied by the East Jersey Water Company.

In 1881 he became chief engineer of the Arcade Railway, a most luxurious project for an underground rapid transit road in the City of New York, providing a second street under Broadway with sidewalks, giving access to underground shop fronts, with four tracks between them for local and express trains. This plan was defeated by the opposition of property owners who resented the interference with their vaults under the surface sidewalks, and a second plan confining the works to the space under the carriage-way was stopped by defects of its charter. Mr. McAlpine retained his connection with it until the last, giving much study to all the details of the work.

In 1883 he again visited Europe to study the underground railways of London with reference to the Arcade Railway. While in England, he was consulted concerning the methods for rapidly constructing the proposed railway to India by the Euphrates Valley—a work at that time considered of pressing necessity. He appears also to have been consulted upon the Manchester Ship Canal, and to have made a report upon the River Nile.

In 1884 he was again one of a commission on the new water supply of Philadelphia, making, himself, a special report on the subject.

In 1885 he was made Chief Engineer of the Harlem River (now the Washington) Bridge, and in July, 1886, was, at his own request, relieved as Chief Engineer, and retained as Consulting Engineer of that work until its substantial completion in 1888.

In 1886, in connection with Mr. Tully, City Engineer, he reported upon a water supply by gravity for Toronto (Canada), and in the same year upon the sewage disposal of that city.

The American Society of Civil Engineers was formed by twelve men

on the 5th of November, 1852. One additional member joined in 1852. Mr. McAlpine entered the Society on the 3d of February, 1853, three months after its foundation and is the 17th on the list.

James Laurie was President from 1852 to 1867, when the Society was revived. Mr. Kirkwood followed for one year. Mr. McAlpine was elected to succeed him, notwithstanding his protest that the President of the Society should be a resident member, and held office for little more than a year. He was a Director from November, 1853, to November, 1870, except for two years, during one of which he was President. In 1888 he was made an Honorary Member of the Society.

In 1873 he presented to the Society his library, containing many old and valuable parliamentary and other reports on railways, canals, water works, etc., etc., and six thick folio bound volumes of manuscript reports.

Elected in 1867, he was the first and for many years the only American member of the Institution of Civil Engineers (London), among the officers and members of which were some of his warmest and most appreciative friends.

At the time of his examination of the Rapids of the Danube he was made a member of the Austrian Society of Engineers and Architects. He was also a member of nearly all the older scientific societies in the United States, the New York Chamber of Commerce, etc.

Mr. McAlpine was a prolific writer. His writings, however, consisted chiefly of reports upon the various projects submitted to him, and the works designed or constructed by him. Among the professional papers of the Institution of Civil Engineers are two by him, and the "Selected Papers" and "Extracts" of that Society contain numerous references to and extracts from his works. He has eight original papers in the *Transactions* of the American Society of Civil Engineers, besides numerous and long discussions.

A partial list of his printed papers, containing 43 numbers, embraces many reports upon works not here mentioned; among others "Galveston Harbor," "The Foundations of the Washington Monument," "The Purification of the Basin of the Harbor of Baltimore," etc., etc. His latest book is a treatise on "Modern Engineering."

As an engineer Mr. McAlpine was original, bold with the boldness that comes of knowledge, a careful observer, a thorough student of the problem before him, and full of resource in the face of difficulties and new conditions. As to his relations to his profession and its members, I quote his words: "Almost, if not quite, the oldest practicing civil engineer in this country * * * my most earnest wishes now are to maintain the dignity of the profession, and to obtain for it the respect of the community. Beyond the necessity of providing a moderate maintenance for my family, my chief object is to lay before the young engineers the experience of a long professional life of practice and

study. Some of you and all of my older friends know that whatever information on any branch of the profession that I have, is as much at their service as if it were their own; and that nothing gives me more pleasure than to be able to contribute to the success of others, and especially of the young engineer." * * * "As a motto to engrave upon your professional shield, I give you these three words, 'Integrity, Industry, Enthusiasm.' * * * That quality which especially has characterized the old fathers of engineering has been their inflexible integrity."

Mr. McAlpine was of a kindly and genial disposition, with great capacity for making friends, and most appreciated where best known. His domestic relations were most exemplary.

His wife, formerly Miss Learned, and several daughters survive him.

A remarkable letter from the late John B. Jervis, is annexed. The position and character of Mr. Jervis need no praise. He writes in a fatherly way of his former pupil, then sixty-two years of age, but the letter is the strongest testimony to the high character of Mr. McAlpine—a testimony not needed to supplement that of his work, but given to show the relations subsisting between these two and their mutual appreciation—mutual, for Mr. McAlpine resented more than an insult to himself the slightest criticism upon the work of Mr. Jervis.

ROME, N. Y., June 29th, 1875.

To the American Society of Civil Engineers :

GENTLEMEN,—Pardon me for a few words of memorizing on one of your former Presidents, in whom I feel an interest as one of my pupils in the profession of civil engineering. As he has taken much interest in the prosperity of your Society, I think you will excuse the liberty I have taken. I do not do this to inform you of his standing in the profession, of which, no doubt, you are well advised, but to put in order so far as I know, the history of his experience, some of which is probably better known to me than to any other.

William J. McAlpine commenced his preparation for the profession of a civil engineer as a pupil of mine in 1827 on the Carbondale Railway in Pennsylvania. He continued most of the time with me until 1837 on the above railway, and on the Mohawk and Hudson, and the Schenectady and Saratoga Railway, the Chenango Canal and the enlargement of the Erie Canal in the State of New York.

On the Chenango Canal he was a Resident Engineer and had charge of the principal office. To him was assigned the duty of gauging the rainfall and the drainage of the Eaton and Madison Brook Valleys, with a view to determine what ratio of rainfall could be relied on for the reservoirs to supply the canal with water. This was a trial on a large scale, and as the two valleys differed in the character of soil, one rather gravelly and the other more compact and impervious, the ratio established has added an important item to engineering science. The reservoirs made on these experiments have now been forty years in operation and have proved the correctness of the ratio established.

Mr. McAlpine had charge of the survey and estimates for the enlargement of the Erie Canal from Little Falls to Albany. A prominent

feature in this work was the examinations for the changes in the old location. There were several of these at different places, but I will only notice in particular the one at Cohoes. The entire line was here changed for a distance of 4 miles, embracing, I think, ten locks. The ground was very rough and required great care in the location of the new line. At this time Mr. McAlpine was about twenty-six years of age. He conducted this service with great care, evincing sound judgment, great sobriety and assiduity in preparing numerous estimates that were required. I think few men of his age would have conducted the service with equal skill and satisfaction.

I left the charge of the Erie Canal enlargement for the division noticed above, in the close of 1836, and Mr. McAlpine was appointed my successor. He remained a number of years in this charge, engaged in the construction of the work, and I believe acquitted himself in a satisfactory manner.

In his subsequent operations as a civil engineer I have had no special connection. I enumerate them as matters of general information, viz.: He was Chief Engineer of the Dry Dock of the Government at Brooklyn, N. Y.; he was State Engineer of New York several years; Railway Commissioner of the State of New York several years. In this last capacity he instituted methods of analysis very useful in railway statistics. He was at one time Chief Engineer of the Erie Railway; of the Chicago and Galena, and the Ohio and Mississippi Railways, and Consulting Engineer on other railways. He was the engineer of the water works for several cities; he has been the consulting engineer for several important bridges, and appointed by the United States Court to report on the Wheeling bridge over the Ohio River.

Mr. McAlpine has been professionally engaged on several commissions in this country, and in preparing plans for the navigation of the Danube, in Austria. At present he is Consulting Engineer for the new Capitol of the State of New York, at Albany, but I will not detain you longer with detail. You see the forty-eight years of his professional life has been a very active one. I remark he has always evinced a high appreciation of the important character of the profession; has been unremitting in his devotion to its service, and, as far as I know, has maintained the same undeviating fidelity that I can vouch for so long as he was acting with me.

Gentlemen, it has appeared to me reasonable that the brief memoir I have written of the proceedings of one of your members, who has been and continues to be actively engaged in promoting the prosperity of your Society, should be accepted as an appropriate item in the archives of your Society. And, now, gentlemen, with best wishes for the prosperity of your Society,

I am very truly yours,
(Signed) JOHN B. JERVIS,

Hon. M. Am. Soc. C. E.

WILLIAM POWELL SHINN, Past President Am. Soc. C. E.*

DIED MAY 5TH, 1892.

William Powell Shinn was born on May 4th, 1834, in Burlington, N. J., where his parents had been residents for many years; his father was a carpenter and builder by trade. After receiving such elementary

* Memoir prepared by M. J. Becker, Past President Am. Soc. C. E.

education as the schools of the town afforded, W. P. Shinn came to Pittsburgh, Pa., early in 1850, and found employment as rodman in an engineer corps, under the charge of Solomon W. Roberts, then engaged in the location of the Ohio and Pennsylvania Road; his first service in that capacity extended from May 1st, 1850, to December, 1850; and from December, 1850, to August, 1851, he served as rodman on construction of the second sub-division of that road, with headquarters at Baden, Pa. From August, 1851, to February, 1852, he was Assistant Engineer in charge of a sub-division at Columbiana, Ohio. From April 1st, 1852, to April 1st, 1853, he had charge of the fuel and water supply of the line. On April 1st, 1853, he was appointed Principal Assistant Engineer of the Fort Wayne and Chicago Railroad, in charge of location and construction, in which capacity he continued until October, 1854. On February 1st, 1855, he took charge, as Auditor, of the freight accounts of the Ohio and Pennsylvania Railroad, retaining this position until November 1st, 1855. From March 1st, 1856, to September 1st, 1856, he was engaged as Engineer in the preparation of the land maps and title records of the Ohio and Indiana Railroad, now forming a portion of the Western Division of the Pittsburgh, Fort Wayne and Chicago Railroad. On October 1st, 1856, he took charge of the freight accounts of the Pittsburgh, Fort Wayne and Chicago Railway, and in addition to these duties, also assumed control of the passenger accounts of that Company for the period from February 1st, 1857, to September, 1857, when he was made general book-keeper, and continued in that office until September 1st, 1861. On this last named date he was appointed General Passenger Agent; on September 15th, 1863, he was made Superintendent of the Eastern Division, and from October 1st, 1865, to April 1st, 1871, held the office of General Freight Agent.

Upon the organization of the Pennsylvania Company, on April 1st, 1871, he was appointed its General Agent, being intrusted with various important and sometimes confidential commissions for the purpose of investigating the financial affairs and examining the physical conditions of some of the railways which, by purchase, lease or traffic contracts, became, from time to time, parts of the Western System of Railways, under the ownership and control of the Pennsylvania Company.

He was also commissioned, in 1870, by the Pennsylvania Railroad Company, to investigate and report the condition of the United Railroads of New Jersey, including its branches, its canal and river navigation property, with lines of ferries and transfer vessels. This report, which is said to have been very clear and exhaustive, determined the lease of these vast properties to the Pennsylvania Railroad Company, and led to the adoption of a number of important improvements and extensive changes suggested in the report.

Aside from his other duties, Mr. Shinn undertook, in 1871, the construction of the Ashtabula, Youngstown and Pittsburgh Railroad, and served as Treasurer of the Granite Improvement Company, under whose auspices this line was built, until its completion in 1873, and, during the years 1874 and 1875, was its President. In January, 1873, Mr. Shinn became the managing partner of Carnegie, McCandless & Company, and took charge of the building and operating of the Edgar Thomson Steel Works, at Braddock, Pa., which establishment has since become one of the most extensive industrial works in the world. On May 1st, 1874, Mr. Shinn was elected Assistant President and Comptroller of the Allegheny Valley Railroad Company; on April 23d, 1875, he was elected its Vice-President; April 19th, 1876, he became a member of its Board of Directors, and on November 28th, 1877, he resigned his office, but remained a member of the Board until March, 1880. At the time of his election as Vice-President, Mr. Shinn was especially charged with the reorganization of the Company, which had been sadly involved in debt and other complications, and by his skillful management and earnest application, he left, upon his retirement, the financial affairs of the Company in a greatly improved condition, such as it had never attained in its previous history.

On October 1st, 1879, he retired from the management of the Edgar Thomson Steel Works, and reorganized the Vulcan Steel Company, of St. Louis; rebuilt and started the works, and continued in charge until 1881, when he was made Vice-President of the New York Steam Company, for the distribution of heat by steam through the streets of the City of New York, and for supplying steam heat to the dwellings and industrial establishments of the City. He remained Vice-President of the New York Steam Company until 1887. From December, 1886 to 1891, he served as Vice-President and General Manager of the New York and New England Railway Company, and in the latter two years he was also President of the Norwich and New York Transportation Company.

Among the local industries of his Pittsburgh home, he was interested in the Mansfield Coal and Coke Company, of which company he was one of the original organizers and for several years President.

During the last year of his life he organized the United States Glass Company, a consolidation of sixteen glass manufactories, having a united capital of \$4 000 000. He was a Director of this Company at the time of his death.

Mr. Shinn was elected a member of the American Society of Civil Engineers on September 15th, 1869, and from this time until the day of his death took a very active part in its affairs, and made his beneficial influence felt and appreciated by the Society in many ways.

His contributions to the *Transactions* of this Society are numerous and valuable. Among them is his paper on "Railroad Accounts

and Returns," published in the *Transactions*, 1876, Vol. V, page 215, a subject to which he had given much attention during his prominent connections with the railway service on several of the leading lines of the country. The object aimed at in this paper was to establish a uniform system of accounts for the observance of the railway companies, under the directions of the Railway Commissioners of the States, the plans for which were to be formulated by a Committee of this Society acting in conjunction with the State Commissioners. The discussion on this subject took a wide range, and although the recommendations of the author failed, the information conveyed by the paper and by the ensuing discussion have been the means of at least a partial adoption of the suggestions of the Railway Companies by the State Commissioners and by the Inter-State Commission.

Mr. Shinn's preliminary report, as Chairman of a Committee on Resistance of Railway Trains, appointed at the meeting of April 6th, 1876, in pursuance of some observations made by Professor Thurston upon the subject of railway transportation, with references to the use of the dynagraph, is published in the *Transactions*, Vol. V, page 341. It contains a description of the newly invented dynagraph and its application for measuring and recording the resistance due to the movements of trains, and furnishes tabulated statements and graphical diagrams of experiments made with that instrument by the Committee. Considering the novelty of the appliance and the limited facilities at the command of the Committee, this report gave remarkably satisfactory results, and led to surprising conclusions, which attracted very general attention in the railroad world at that time.

As a sequel to the report last mentioned, Mr. Shinn read, at a meeting of the Society on December 20th, 1882, a paper on the "Increased Efficiencies of Railways for the Transportation of Freight" (*Transactions*, Vol. XI, page 365), which shows a most careful research and minutely elaborated detail on this topic, with many remarkable deductions from the experiences of the past and predictions for the future, which have since been verified to a wonderful extent. During the lengthy discussion which followed this paper at the annual meeting on January 17th, 1883, Mr. Shinn not only maintained his ground against all criticism, but brought out many new facts in confirmation and support of his original views. The Norman medal of the Society was awarded him for this paper. Again, at the Annual Convention in Minneapolis, on June 19th, 1883, Mr. Shinn read another paper on the "Efficiency of Railways for Freight Transportation" (*Transactions*, Vol. XII, page 189), in which he sums up the previous discussions, and replies at great length to his critics by an exhaustive array of additional facts, covering sixty-three pages of the *Transactions*.

Still following up this subject, Mr. Shinn again presented to the Society a paper on "Power Brakes for Freight Trains," published in

the *Transactions*, June 26th, 1885, Vol. XIV, page 405. While his expressed preference in favor of Buffer brakes as against the Westinghouse Automatic, in the light of our present knowledge, must be admitted to have been a mistake, his painstaking labors in collecting the data and summarizing the results of numerous tests furnished a large amount of valuable information, and by pointing out the advantages and defects of the various types of brakes, and their important effects upon the movement of trains, he placed himself upon record as an advocate of power brakes far in advance of his too tardy followers.

Aside from these original contributions to the *Transactions* of the Society, Mr. Shinn has taken an active part in the discussions of numerous papers, covering a great variety of professional subjects. His remarks on the paper by Martin Coryell, M. Am. Soc. C. E., on "Transportation," *Transactions*, Vol. II, page 249; on the paper by J. Dutton Steele, M. Am. Soc. C. E., on "Railway Signals," *Transactions*, Vol. IV, page 238; on the paper by O. Chanute, M. Am. Soc. C. E., on "Cheap Railroad Transportation, and American Locomotives"; on the "Report of the Committee on Test of Cements"; on Professor Egleston's paper on "Decay of Building Stones"; and on the paper "English and American Railways Compared," by E. B. Dorsey, M. Am. Soc. C. E., all bear testimony of the wide range of his useful knowledge and the extent of his practical experience.

In the Board of Direction, and in the sessions of the committees, his services were invaluable.

Although engaged, during all the mature years of his life, in active business pursuits, and occupying positions of great responsibility, requiring constant care and attention, he was always ready to respond to any call for the gratuitous performance of often vexatious and onerous duties for the benefit of the societies of which he was a member; and some of his best efforts are entirely spontaneous productions, conceived by an unselfish desire to promote some worthy enterprise, or to improve some object of common general utility.

A few years ago it became manifest that a large number of the members of this Society, actuated no doubt by perfectly sincere, though widely differing, motives, desired a reform in the fundamental laws governing its management, and it devolved upon the presiding officer to select a special committee for the revision of the Constitution. It is no disparagement to the other members of this Committee to attribute the larger share of the success which attended its labors to the conspicuous services of its chairman, Mr. W. P. Shinn, who, with untiring zeal, devoted himself to his task, and, with rarest tact, presided over its deliberations, which resulted in the formulation of a Constitution so clear, so thorough and appropriate that, when submitted to the Society at large for final ratification, it was received with the most general approval, and was adopted, after a short discussion, with

but a few slight modifications, meeting with universal satisfaction to such a degree as to conciliate all opposing factions, and to harmonize and reunite the membership of the Society as it had never been united before.

On January 15th, 1889, Mr. Shinn was made a Director, and on the 15th of January, 1890, he was elected President of the American Society of Civil Engineers.

Mr. Shinn was also elected, in 1875, a member of the American Institute of Mining Engineers, his leading proposer being Alexander L. Holley; in 1876 and 1877 he was one of the Vice-Presidents, and in 1880 he was elected its President. His contributions to the *Transactions* of the Institute of Mining Engineers comprise, besides remarks in discussions, the following original papers: "Pittsburgh, its Resources and Surroundings" (1879, Vol. VIII, page 11); "The Advance in Mining and Metallurgical Art, Science and Industry since 1875" (President's Address, February, 1881, Vol. IX, page 293); "The Distribution of Steam in Cities" (1884, Vol. XII, page 632); and "The Genesis of the Edgar Thomson Blast Furnaces" (1890, Vol. XIX, page 674).

He was also elected a member of the Iron and Steel Institute of Great Britain on February 3d, 1891.

In 1890, the Institute of Mining Engineers, and the societies and trades co-operating with it in the reception of the Iron and Steel Institute of Great Britain and other foreign guests, requested Mr. Shinn to act as Chairman of the Sub-Committee on Transportation of the General American Reception Committee. In this arduous undertaking his natural administrative ability and great practical experience in conducting transportation came in good play, and largely contributed to the wonderful success which attended the magnificent excursions of more than 500 guests over several thousands of miles of railroads, through eighteen States of the Union, lasting a full month, and terminating, without delay or accident, promptly on time.

For his untiring attention to the visiting guests during this remarkable trip, the Iron and Steel Institute of Great Britain and the "Verein Deutscher Eisenhuetten Leute" presented Mr. Shinn with beautiful and substantial memorials, of exquisite design and workmanship, and expressed their gratitude and appreciation in the tenderest terms of acknowledgment.

Mr. Shinn was married in July, 1856, to Miss Sallie Templeton Farley, daughter of Mr. Thomas Farley, of Allegheny, Pa., who died at her home near Pittsburgh, Pa., on September 16th, 1890, after a long and painful illness.

Mr. Shinn survived his wife until May 5th, 1892, when he died at his home, after a somewhat protracted sickness, from which he seemed to have partially recovered, when he was suddenly stricken down while on a visit in New York, and died a few days after his return.

His personal habits were quiet, reserved and unobtrusive; his mode of life was exceedingly frugal—almost severe in its simplicity, so much so as to suggest the question how, with his plain and meager sustenance, he could maintain the remarkable mental activity and intellectual energy with which he continually taxed himself.

In his domestic relations he always appeared quietly happy and contented. Left without children, all his affections were bestowed upon his feeble and delicate wife, who, as her sufferings increased with her declining health, received his undivided attention and unremitting care. Those who listened to the pathetic passages of his speech at the banquet of the Cresson Convention will remember the touching tenderness with which he lamented the absence of his wife, then stricken with the fatal illness from which she never recovered. She was, he told us, the first lady who graced these meetings with her presence, and who, by her example, inaugurated this most pleasing social feature of our annual conventions.

Endowed, as he was by nature, with an unusually active mind, capable of grasping, comprehending and analyzing any subject which was submitted to him, or which attracted his attention, to which accomplishment was added the gift of graceful speech, with a large store of practical knowledge upon a great variety of subjects gathered by extensive observation and long experience, and an all-pervading habit of systematic order, it is but natural that he should have become a most useful member of this Society, a valuable counselor in its administration, and a most efficient executive and presiding officer. The courteous affability, the dignified bearing, the prompt and always ready ruling with which he conducted a debate, summarized a proposition or stated a point at issue, often elicited our admiration, while the invariable justice of his decisions always commanded our respectful acquiescence.

With our grief over the loss of a dear and valued friend, with our regret over the departure of a good and virtuous man, there may still be mingled the sad but pleasing consolation, that his life has been a bright example for his fellow-men, and that the world has been made better by his presence.

ELIJAH POLHILL BUTTS,* Jun. Am. Soc. C. E.

DIED JANUARY 11TH, 1892.

Elijah Polhill Butts was born at Macon, Ga., August 10th, 1856. He was the son of James R. and Louisa M. (Polhill) Butts. His father came originally from Connecticut, but spent his working life in Georgia.

* Committee to prepare: Memoir Geo. S. Morison, M. Am. Soc. C. E., and Alfred Noble, M. Am. Soc. C. E.

Young Butts attended the common schools of Macon, and at the age of fifteen entered Marcy University in that city, taking a classical course. He never graduated, but left college in the middle of his Junior year, and resided for some years at Darien, Ga. In 1878 he went to Texas, where he began his professional work, first as axeman and subsequently in various positions up to transitman on the location and construction of the Missouri, Kansas and Texas, and other railroads.

In the fall of 1882, his work took him to Shreveport, La., where Alfred Noble, M. Am. Soc. C. E., was Resident Engineer of the bridge across the Red River. Mr. Noble wanted an assistant and employed Mr. Butts. This was the turning point in the life of the latter, and all the work which he subsequently did grew naturally out of this beginning. He was afterwards assistant to Mr. Noble at Ainsworth, Washington Territory, on the bridge for the Northern Pacific Railroad, across the Snake River at that point, and subsequently on the construction of a smaller bridge known as the Second Crossing of Clark's Fork on the Northern Pacific Railroad.

On May 12th, 1884, Mr. Butts was married at Harpersville, Shelby County, Ala., to Miss Adrienne Creswell, daughter of the Hon. David Creswell, of Shreveport, La. He returned, however, to the north, and was Assistant Engineer on the building of the iron structure on the Northern Pacific Railroad, known as the Marent Guleh Viaduct, near Missoula, Mont.

His next engagement was on the bridge across the Mississippi River at Keithsburg, Ill., and in 1885-86 he was employed as an Inspector on the two bridges across the Missouri River at Omaha and at Rulo, Neb., both of which were being built under the direction of George S. Morison, M. Am. Soc. C. E., Chief Engineer. In the spring of 1887, Mr. Butts went to Oregon, and was an assistant on the construction of the bridge across the Willamette River, at Portland, and subsequently on the bridge across the Snake River at Riparia, Washington, Mr. Morison being the Chief Engineer of both bridges. On the completion of the Riparia bridge, in the spring of 1889, Mr. Butts went to Cairo, where he acted as Assistant Engineer to Mr. Noble on the bridge across the Ohio River at that point until the end of November, 1889, when the bridge was opened for traffic.

After leaving Cairo he made, under the direction of Mr. Morison, an examination of all the bridges on the Missouri, Kansas and Texas Railway, thus going back for a short time to his original field. In July, 1890, he was appointed Resident Engineer of the bridge across the Missouri River at Burlington, Ia., which was being re-constructed as a double track bridge under the direction of Mr. Morison. This was really the first work of which Mr. Butts ever had complete immediate charge, his other work having been that of an assistant under a Resident Engineer. The work at Burlington was of a character to call

for executive ability, as traffic had to be maintained on the old bridge, while the piers were altered to carry the new double track superstructure. Everything was done by days' work, there being no contracts excepting for the furnishing of material. Mr. Butts proved to be the right man for the place, and the work was handled with energy and care.

On the 11th of January, 1892, when the erection of the six fixed spans of the bridge had been completed and the pivot pier was being altered to receive the new span, the old draw being blocked up on temporary supports, Mr. Butts was struck by a stone thrown from the pier and received injuries from which he died before midnight. No one saw the accident, and all that was known was that he was found nearly unconscious under the pier, with a fractured skull.

He was elected a Junior in this Society November 3d, 1886.

Mr. Butts was a man who combined in a larger degree than young engineers often do, the faculty of handling men with energy and business tact. He was exceptionally active and quick in his work, he had barely reached the period in his professional life when he could show what he was capable of, and those who knew him best, expected for him a very successful career.

Mr. Butts left a family consisting of a widow and four little girls, all of whom returned to live with the mother's relatives in Louisiana.

ARTHUR OWEN WILSON, M. Am. Soc. C. E.*

DIED DECEMBER 20TH, 1891.

Arthur Owen Wilson was born February 22d, 1854, in Norfolk, England. He was the grandson of John Owen Parr, Vicar of Preston. He was elected a member of the American Society of Civil Engineers, May 7th, 1888. His death occurred December 20th, 1891. Mr. Wilson received an engineering education and some practice in his native country. At an early age, his spirit of enterprise induced him to come to America, where he immediately found employment, in 1870, as assistant on the survey and extension of the Northern Railway of Canada. He was subsequently employed as assistant in the enlargement, to 14 feet of sill depth, of the Welland Canal, remaining there until its completion. In 1878 he moved to the United States where he soon found employment, first as Principal Assistant, and then as Resident Engineer on the construction of the South Pass jetties. His faithful service there found just and valuable recognition by Captain James B. Eads, and when, in 1881, the Mexican Government

* Memoir prepared by B. M. Harrod, M. Am. Soc. C. E.

undertook the improvement of the bar and harbor of Tampico, on the plan and under the direction of Captain Eads, Mr. Wilson was placed by him in charge of the survey. This introduction to Mexican work led to his appointment as Locating and Constructing Engineer of the St. Louis and Potosi Division of the Mexican Central Railway. The hardships and privations encountered while on this service seriously impaired Mr. Wilson's health, and, in 1883, he returned to the United States.

For the next three years he served as U. S. Assistant Engineer, under the Mississippi River Commission, on the work for the rectification of the Red and Atchafalaya rivers, where he rendered arduous and valuable service.

In 1886 Mr. Wilson opened an engineer office in Birmingham, Ala. He there took an active part in many of the enterprises, which promoted the development of that great industrial center. He located and built the Sloss Mineral Railway, the Birmingham M. & N. Mineral Railway, the Clifton and Red Mountain Railway, the East Birmingham and the Steam Motor Lines, and located the Trussville and the Ensley City Branches of the Alabama Great Southern Railway. He was also connected with several land companies and other engineering enterprises.

In 1888, when comparatively duller times pervaded Birmingham, Mr. Wilson moved to Huntsville, Ala., and from that time until his death, was most actively engaged in a succession of important enterprises, undertaken to secure the development of the iron and coal resources of Alabama and the adjacent States. He organized, located and built the Huntsville Belt, and Monte Sano Railway. The necessary grades and curves of this road involved several difficult and interesting engineering problems which Mr. Wilson solved with ingenuity and judgment. After its construction, he continued to serve as Chief Engineer and General Manager of the road.

Other works of which he had charge were the improvement of Brunswick, Ga., by docks and other public works, and especially the Windsor Park property of the Brunswick Land Company, of which he was Consulting Engineer. He was also Engineer of the Bridgeport Land and Improvement Company, engaged in developing the mineral wealth of the Sequatchee Valley.

It will be seen from this brief abstract of his life that Arthur Wilson was a man of untiring enterprise and activity. He was fully abreast of the great Southern industrial movement which has made the past decade so eventful in that section. He always eagerly sought the scene of greatest professional activity, and engaged in it with skill and energy. To these qualities, essential to success in the times and places where his work lay, he added a good professional education, enlarged by a very active and varied experience, and combined with

great natural fitness for, and devotion to, the life-work he had selected.

He was of strong constitution, large and robust frame, and of very handsome bearing. He was of good judgment, prompt and firm in action, and fertile in resources. With a manner and will that commanded respect, he combined qualities of heart that secured the confidence and regard of his associates and the devotion of his family and friends.

He was thus well equipped for usefulness and success as an engineer, and thoroughly adapted to his professional environment. Unfortunately, he was cut down in early manhood.

Mr. Wilson leaves a wife, the daughter of Mr. Hugh C. Barwick, an eminent Canadian banker, and four young children.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
FRANCIS, CHARLES.....	Commissioner of Public Works, Davenport, Iowa.....	May 4, 1892
LYNCH, MICHAEL LEHANE.....	Fort Worth, Texas.....	May 4, 1892
TOMLINSON, SAM.....	(Care W. E. Moore), 69 St. Paul's Road, Shipley, York- shire, England.....	Apr. 6, 1892
VON GELDERN, OTTO.....	819 Market st., San Francisco, Cal.....	May 4, 1892

ASSOCIATE MEMBERS.

AYCRIGG, WILLIAM ANDERSON....	32 Warren st., New York City.	May 4, 1892
CUMMINGS, ROBERT AUGUSTUS....	N. & W. R. R., 67 } State st., Colum- } bus, Ohio. }	Jun. Oct. 1, 1890 Assoc. M. May 4, 1892
ELLIOTT, JOHN STUART	Jamaica Ry. Extension, Mon- tego Bay, Jamaica, West Indies.....	May 4, 1892
FISHER, JANON.....	905 Cathedral st., Baltimore, Md.....	May 4, 1892
FOCHT, LOUIS.....	Asst. Engineer N. J. Div. Le- high Valley R. R., Bethle- hem, Pa.....	May 4, 1892
HAWLEY, WILLIAM CHAUNCEY....	1625 Monadnock } Bldg., Chicago, } Ill. }	Jun. Oct. 1, 1890 Assoc. M. Apr. 6, 1892
HILL, JOHN EDWARD.....	P. O. Box 1705, Ithaca, N. Y....	May 4, 1892

HOUSTON, JOHN JAY LAFAYETTE..	Resident Engineer New York, New Haven & Hartford R. R., Westfield, Mass	May 4, 1892
PORTER, JAMES MADISON	Lafayette College, Easton, Pa.,	May 4, 1892
STRACHAN, JOSEPH	352 Putnam ave., Brooklyn, N. Y.....	May 4, 1892
WEBB, WALTER LORING.....	40 Hazen st., Ithaca, N. Y....	May 4, 1892
WHITTEMORE, WALTER FRANK....	439 Garden st., } Jun..... Hoboken, N. J. } Assoc. M.	Mar. 6, 1889 Apr. 6, 1892

ASSOCIATES.

ELY, GEORGE HERVEY.....	Cleveland, Ohio.....	May 31, 1892
MARRIOTT, CLARENCE BOYD.....	106 East Saratoga st., Balti- more, Md.....	May 3, 1892

JUNIORS.

BONNETT, LOUIS BLAKE.....	Elizabeth, N. J.....	May 3, 1892
CARTER, SHIRLEY.....	9 Pleasant st., Baltimore, Md..	May 31, 1892
EDWARDS, JAMES HARVEY.....	East Berlin, Conn.....	May 31, 1892
JEWETT, CHARLES HENRY	Keyport, N. J.....	May 31, 1892
LOWINSON, OSCAR.....	Engineer Springfield Iron Works, Springfield, Mass ..	May 3, 1892
MARTIN, WISNER BELL.....	Engineer Corps Pennsylvania R. R., Jersey City, N. J.....	May 3, 1892
MONTONY, LIBERTY GILBERT....	38 West 34th st., New York City.	May 3, 1892
POLK, WALTER HOWE.....	Vicksburg, Miss.....	May 3, 1892
VAN CLEVE, AARON HOWELL....	48 Fifth st., Niagara Falls, N. Y.....	May 31, 1892
WING, FREDERICK KELLY.	112 White Bldg., Buffalo, N. Y.	May 31, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

ANDREWS, D. M.....	Lincoln, Ala.
BEAHAN, WILLARD.....	240 Eleventh st., Jersey City, N. J.
BILLIN, CHARLES E.	Supt. Bridge and Cons. Dept., Penn. Steel Co., Harrisburg, Pa.
BREEN, HOWARD.....	1641 California st., Denver, Colo.
CHANUTE, OCTAVE	413 Huron st., Chicago, Ill.
FLAGG, J. FOSTER.....	195½ Sixth ave., Brooklyn, N. Y.
GERBER, EMIL	800 The Temple, Chicago, Ill.
GOLDMARK, HENRY.....	Constr. Dept. World's Columbian Exposition, Jackson Park, Chicago, Ill.
GRAHAM, CHARLES H.....	Office Engineer of Constr. Dept. Public Parks, 64th st. and Fifth ave., New York City.
HARROD, BENJAMIN M.....	19 Masonic Bldg., Chicago, Ill.
HAZLEHURST, GEORGE B.....	Ellicott City, Md.

JAYCOX, THOMAS W.....	Raton Water Works Co., Raton, N. M.
LEDERLE, GEORGE A.....	401 Roe Bldg., St. Louis, Mo.
MARR, GEORGE A	Office U. S. Portage Lake and Lake Superior Canals, Houghton, Mich.
McMATH, ROBERT E.....	President R. E. McMath Surveying Co., 213 North 8th st., St. Louis, Mo.
PAINE, ARTHUR B.....	35 Broadway, New York City.
PIHL, O. R.....	611 Marquam Bldg., Portland, Ore.
RICHARDSON, THOMAS F.....	Asst. Engineer Sanitary District, 526 Rialto Bldg., Chicago, Ill.
ROBINSON, JOHN J.....	Union Place, Brooklyn Hills, Woodhaven, N. Y.
RUTHERFURD, FRANCIS M.....	Engineer Maintenance of Way, R. & D. R. R., Richmond, Va.
SHANKLAND, E. C.....	Engineer of Construction World's Columbian Exposition, Jackson Park, Chicago, Ill.
SMITH, T. GUILFORD.....	9 German Insurance Bldg., Buffalo, N. Y.
STANTON, ROBERT B.....	2 Wall st., New York City.
TOMPKINS, J. A. B.....	Div. Engineer G. N. Ry., Wenatchee, Wash.
VAN WINKLE, EDGAR B.....	Litchfield, Conn.
WARD, CHARLES D.....	42 West Fifth st., Oswego, N. Y.
WRIGHT, A. W.....	1217 Monadnock Bldg., Chicago, Ill.

ASSOCIATE MEMBERS.

CARR, ALBERT	22 Sanford st., East Orange, N. J.
CONNOR, EDWARD H.....	902 The Temple, Chicago, Ill.
CUNNINGHAM, A. C.....	25 N. Pearl st., Albany, N. Y.
SISSON, WM. LEE.....	Box 31, Kensington, Md.
WILLARD, J. MILTON.....	526 Rialto Bldg., Chicago, Ill.

ASSOCIATE.

BREUCHAUD, JULES.....	Palenville, Greene Co., N. Y.
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JUNIORS.

BERRALL, JAMES.....	Montclair, N. J.
BLODGETT, JOHN.....	Boston Bridge Works, East Cambridge, Mass.
CARRERE, J. MAXWELL.....	1 Union Square, New York City.
DEANS, CHARLES H.....	1218 Filbert st., Philadelphia, Pa.
ELLSWORTH, A. B.....	52 West Eagle st., Buffalo, N. Y.
FULLER, WILLIAM B.....	59 Mountain ave., Malden, Mass.
LYDON, WILLIAM A.....	1205 Unity Bldg., 79 Dearborn street, Chicago, Ill.
McCORMICK, GEORGE K.....	Wilkes Barre, Pa.
McMEEKIN, CHARLES W.	Prin. Assist. Engineer Construction Butte Water Works, Butte, Mont.
VIELÉ, MAURICE A....	476 West 152d st., New York City.
VILLALON, JOSÉ R.....	Res. Engineer Ponupo Manganese & R. R. Co., Santiago, Cuba.
WILSON, F. W.....	18 Broadway, Room 520, New York City.

FELLOW.

BOUTON, NATHANIEL S. Kenwood Bridge Co., 614 First National Bank,
Bldg., Chicago, Ill.

DEATH.

SHINN, WILLIAM P. Elected Member, September 15th, 1869 ; died
May 5th, 1892.

DROPPED.

MEMBER.

SCOTT, CHALMERS, Date of
Action of Board.
May 31, 1892

BOOK NOTICES.

ROAD CONSTRUCTION AND MAINTENANCE.

Reprinted from *The Engineering Record*. 5 $\frac{3}{4}$ x 7 $\frac{1}{2}$ inches, cloth,
pp. 109. *The Engineering Record*, New York, 1892.

In 1890, *The Engineering Record* instituted a prize competition for essays on the construction of roads. In response to the invitation to contribute, twenty-one essays were submitted. A committee, consisting of engineers of wide experience, read these papers and awarded the prizes to the three persons whose contributions are here re-published. Abstracts from essays receiving honorable mention also form a portion of the book.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Charles A. Allen, Worcester, Mass.:

Report on the Abolition of Grade-Crossings in the City of Worcester, Mass.

From American Institute of Mining Engineers:

A modern Plant for the Precipitation of Gold from Chlorine Solution by Sulphurous Acid and Hydrogen Sulphide.

A new Method of removing Skulls from direct Metal Ladles.

A new Tin Mineral in the Black Hills.

A preliminary Sketch of the Phosphates of Florida.

Basic Slags as Fertilizers.

Biographical Notice of Edward Nichols.

Bohemian Garnets.

Florida Phosphates.

Laurentian low-grade Phosphate Ores.

Note on a Collection of Tertiary Fossil Plants from Potosi, Bolivia.

Notes on a novel Cable-transfer for Railroad Cars.

Phosphate Chemistry as it concerns the Miner.

The Control of Silicium in Pig-iron.

The late Discovery of large Quantities of Magnetic and Non-magnetic Pyrites in the Croton Magnetic Iron Mines.

The Preservation of the Hearth and Bush-walls of the Blast furnace.

The simultaneous Production of Tar, Ammonia and Heating Gas.

Titaniferous Iron Ores of the United States.

- From Board of Railroad Commissioners, New York:
Ninth Annual Report for 1891.
- From Denver Society of Civil Engineers:
Transactions, Vol. III-IV, Jan.-Dec., 1891.
- From M. T. Endicott, U. S. Navy Dept.:
History of the U. S. Navy Yard at Gosport, Va.
- From Engineers' Club, N. Y.:
Constitution, Rules, Officers and Members, 1891.
- From Engineers' Society of Western Pennsylvania:
Proceedings of March 15, 1892.
- From A. Fteley, C.E., N. Y.:
Report of the Rapid Transit Commission to the Massachusetts Legislature, April 5, 1892.
- From Robert L. Harris, C.E., N. Y.:
A new Process for dealing with Quick-sand.
- From J. B. Henderson, Hydraulic Engineer, Brisbane, N. S. W.:
Map of Queensland showing average Rainfall.
Diagrams of Rainfall at Townsville, Rockhampton, Brisbane and Mackay.
- From Institution of Civil Engineers, London:
Arauco Railway and Bio-Bio Bridge.
Behaviour of Portland Cement in Sea-Water.
Building Stones of Great Britain.
Hawarden Bridge.
Portland Cement.
Portland Cements at Havre.
Sale of Water by Meter in Berlin.
Southampton Water Works and Softening Plant.
Weighing Machines.
Proceedings, Vol. CVII.
- From Iron and Steel Institute.
Journal No. 2, 1891.
- From John Kennedy, C. E., Montreal, Can.:
Annual Report of the Harbor Commissioners for the year 1891.
- From Horace Kephart, Librarian, St. Louis:
Forty-sixth Annual Report of the Board of Direction of the St. Louis Mercantile Library Association, 1891.
- From L'Association des Ingenieurs de Gand:
Annales de l'Association, Tome XV.
Deuxieme Livraison, 1891-92.
- From E. D. Leavitt, C. E., Boston, Mass.:
Specifications and Contract for High-Service Pumping Engine, No. 3. Boston Water Works.
- From Mansfield Merriman, South Bethlehem, Pa.:
Register of Lehigh University, 1891-92.
- From Midland Institute of Mining, Civil and Mechanical Engineers:
Proceedings of Meeting, Nov. 17, 1891.
- From F. D. Millet, N. Y.:
Kühl on the Sulima Branch of the Danube.
Carte de la Danube et des ses Embrochements entre Braila et la Mer.
- From John F. O'Rourke, N. Y.:
Report of the Rapid Transit Railroad Commissioners for the City of New York, October, 1891.
- From Pennsylvania Railroad Company:
Forty-fifth Annual Report.
- From Rensselaer Polytechnic Institute:
Annual Register, May, 1892.
- From George S. Rice, C. E., Boston, Mass.:
Report of the Rapid Transit Commission to the Massachusetts Legislature, April 5, 1892.
- From J. Herbert Shedd, City Engineer, Providence, R. I.:
Annual Report of the City Engineer of the City of Providence, R. I., for the year 1891.
- From James M. Swank, Phila., Pa.:
Annual Statistical Report of the American Iron and Steel Association, May 16, 1892.
- From W. W. Thayer, C. E., Phila.:
Street Paving; Its Cost, Character and Construction.
- From L. L. Tribus, C. E., N. Y.:
Photograph of Water Tower at Plainfield, N. J.
- From T. Trudeau, C. E., Ottawa, Can.:
Annual Report of the Department of Railways and Canals for the fiscal year, 30th June, 1890, to 30th June, 1891.
- From Irving S. Upson, New Brunswick, N. J.:
Annual Report of the State Geologist, New Jersey, for the year 1891.
- From U. S. Coast and Geodetic Survey:
Report for 1890.
- From U. S. Department of Agriculture:
Annual Summary for 1891.
Supplement to Monthly Weather Review for December, 1891.
- From U. S. Department of State:
Commercial Relations of the United States, 1887 and 1888, 1888 and 1889.
Consular Report No. 139, April, 1892.
- From United States Geological Survey:
First Report of the U. S. Board on Geographical Names, 1890-91.
- From U. S. Navy Department:
Pilot Chart of North Atlantic Ocean, May, 1892.
Liste des Bâtiments de la Marine Française (Guerre et Commerce) et de leurs Signaux Distinctifs.
- From U. S. Patent Office:
Alphabetical List of Patentees and Inventions for the quarter ending December 31, 1891.
- From U. S. War Department, Chief of Engineers:
Reports relative to the Improvement of the Channel of Boston Harbor; to the Construction of a Bridge in Duluth; of Survey of Grand River below Grand Rapids; to proposed Water-way between Delaware Bay and Rehoboth Bay; to Bridge across the Mississippi River at Memphis; to Portage Lake and Lake Superior Canal; to Ship Canal, from the Great Lakes to the Navigable Waters of the Hudson River; relative to accounts of Lt.-Col. Geo. H. Elliott.
- U. S. Engineer Improvement of the Great Kanawha River, West Virginia.
Detailed Drawings of Lock and Dam No. 7.

Proposals and Specifications, as follows:

For Removing Draw Bridge at the Locks
of the Louisville and Portland Canal.

For Constructing Earthen and Pile Dikes
at the Mouth of the Schuylkill River,
Pa.

For Constructing a Stone Wharf near the
Mouth of Kennebunk River, Me.

For Furnishing and Placing Stone in
Breakwater near Bar Harbor, Me.

For Furnishing and Delivering Rosendale
Cement and Broken Stone at Fort
Delaware. and at Pea Patch Island,
Del.

For Removal of the Schooner "Ann P.
Rogers," and of Wreck in Philadelphia
Harbor.

For Protection Crib at Duluth, Minn.

For Iron Work for Movable Dams in the
Great Kanawha River.

For Removing Obstructions in the
Niagara River.

For Timber for Lock and Dam at Kamps-
ville, Ill.

From U. S. War Department, Chief of Ord-
nance:

Report of the Chief of Ordnance for 1891.

From George E. Waring, C. E., Newport, R. I.:
The Sewerage of two New England Towns,
Keene and Laconia.

From Herbert M. Wilson, C. E., Washington,
D. C.:

U. S. Geological Survey Map of New York
and Vicinity.

From E. D. Worcester, Secretary, N. Y.:
Twenty-second Annual Report of the
Lake Shore and Michigan Railroad
Company, 1891.

From World's Columbian Exposition, Chi-
cago, Ill.:

World's Fair Notes.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—June, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

ANNUAL CONVENTION OF THE SOCIETY HELD AT OLD POINT COMFORT, VA.,
JUNE 8TH-13TH, 1892.

FIRST SESSION, WEDNESDAY, JUNE 8TH, MORNING.—The Convention was called to order by the President of the Society, Mr. Mendes Cohen. The Secretary, Mr. F. Collingwood, made announcements as to the programme, papers to be read, etc., after which the presentation of papers was at once taken up.

The first paper presented on "Uniform Practice in Pile Driving" by J. Foster Crowell, M. Am. Soc. C. E., was read by the author, and discussed by Messrs. Wellington, Trautwine, Brush, Bouscaren, Durham, Craighill, Haupt and Crowell.

SECOND SESSION, WEDNESDAY AFTERNOON.—The first paper was read by its author, John B. Duncklee, M. Am. Soc. C. E., his subject being "The Iron Wharf at Fort Monroe, Va.," after which an abstract of the paper on "The Iron Coal Pier of the Norfolk and Western Railroad Company, at Lambert's Point, Va.," by W. W. Coe, M. Am. Soc. C. E., was read by the Secretary. A general discussion on these

papers followed, by Captain Black, Messrs. Stanton, Seaman, Haupt, Watson, Skinner, Davis and Dunklee.

Desmond FitzGerald, M. Am. Soc. C. E., then read his paper on "Rainfall, Flow of Streams and Storage," which was discussed by Messrs. Francis and Haupt.

The Convention then adjourned to visit, by invitation of Colonel Royal T. Frank, U. S. A., Commandant, the Artillery School at Fort Monroe, and to witness a special review tendered in honor of the Society.

THIRD SESSION, WEDNESDAY EVENING.—The President of the Society, Mr. Mendes Cohen, delivered the annual address, the subject of which was "The History of the Baltimore and Ohio Railroad."

THURSDAY, JUNE 9TH, was entirely occupied by an excursion by steamer to the U. S. Navy Yard at Portsmouth, Va., where the Society was received officially by Commodore Weaver, U. S. N., and his officers, and made an interesting tour of inspection of the work in progress at the Yard. The excursion was continued by boat and rail to Virginia Beach, where dinner was served, and the return to Old Point Comfort was made in the late afternoon.

FRIDAY, JUNE 10TH, MORNING.—The regular Business Meeting of the Convention was held, President Cohen in the chair. (For the record of the business meeting, see page 142 of the current *Proceedings*.)

FOURTH SESSION, FRIDAY AFTERNOON.—President Cohen in the chair. The following papers were read by abstract by the Secretary: "Hardening Structural Steel," by A. C. Cunningham, Assoc. M. Am. Soc. C. E.; "The Results Obtained from Tests of Full-Sized Steel Eye-Bars," by Frederick H. Lewis, Esq.; "Experiments on Iron and Steel Joints Riveted on an Angle," by Bertram B. Flint, Esq.; and discussion followed, by Messrs. Roberts, Metcalf, Dragron and Gottlieb. J. G. Dragron, M. Am. Soc. C. E., read a paper on "The Protection from Corrosion, of Iron Work used as a Covering for Railroad Tunnels," which was discussed by Messrs. Macdonald, Frazier and Dragron. The Convention then adjourned to witness artillery practice at Fort Monroe and the interesting construction work in charge of Lieutenant Zinn, Corps of Engineers, U. S. A.

FRIDAY EVENING.—Mr. A. Fteley, Chief Engineer of the New Croton Aqueduct, described that work, the description being illustrated by many lantern slides showing its important details.

SATURDAY, JUNE 11TH.—The morning was devoted to an excursion by steamer to the Ship Yard and Dry Dock at Newport News, Va.

FIFTH SESSION, SATURDAY AFTERNOON.—The Business Meeting of the Convention was continued, and after its adjournment a session was devoted to the discussion of Mr. FitzGerald's paper, which was taken part in by Major B. M. Harrod. Messrs. A. Fteley and Clemens Herschel; and a written discussion by Mr. F. P. Stearns was read by the Secretary.

Mr. Bogart, on behalf of the New Jersey Bronze Works, presented to the Society a statuette from the original of Pierre Massent, entitled "La Gloire de Fer," and two accompanying candelabra.

SATURDAY EVENING.—The annual banquet was served, there being present many ladies and also guests from the Army and Navy.

MONDAY, JUNE 13TH.—The Business Meeting of the Convention was resumed, and, after an extended session, adjourned *sine die*.

The following 125 members were in attendance at the Convention: John B. Atkinson, Earlington, Ky.; H. Bissell, Boston, Mass.; John W. Bacon, Danbury, Conn.; W. M. Black, Willets Point; John Bogart, A. P. Boller, W. H. Breithaupt, Charles B. Brush, New York; John B. Bott, Baltimore, Md.; G. Bouscaren, Cincinnati, Ohio; Channing M. Bolton, Atlanta, Ga.; S. H. Chittenden, East River, Conn.; Thomas C. Clarke, Theodore Cooper, J. James R. Croes, J. Foster Crowell, New York; F. Collingwood, Elizabeth, N. J.; Amory Coffin, Phoenixville, Pa.; Mendes Cohen, William P. Craighill, Baltimore, Md.; W. E. Cutshaw, Richmond, Charles S. Churchill, Roanoke, Va.; W. W. Card, Pittsburgh, Pa.; L. E. Chapin, Canton, Ohio; R. L. Cobb, Clarksville, Tenn.; Joseph P. Davis, Stancliff B. Downes, C. Wheeler Durham, New York; James G. Dagron, Baltimore, Md.; Charles E. L. B. Davis, John B. Duncklee, Washington, D. C.; E. C. Dunn, Alexandria, W. F. Dennis, Richmond, E. L. Du Barry, Crewe, Va.; A. Dempster, Pittsburgh, Charles Davis, Allegheny, Pa.; M. M. De Frees, Indianapolis, Ind.; Frank P. Davis, San Juan del Norte, Nicaragua; Oscar Erlandsen, Poughkeepsie, N. Y.; M. T. Endicott, Washington, D. C.; R. L. Engle, Cincinnati, Ohio; James B. Francis, Lowell, Desmond FitzGerald, Brookline, Mass.; A. Fteley, New York; J. Foster Flagg, Brooklyn, N. Y.; Clark Fisher, Trenton, N. J.; Felix Freyhold, Washington, D. C.; Harry Frazier, Richmond, Va.; Mark Fergusson, Southport, N. C.; Joseph P. Frizell, Austin, Texas; Wilbur F. Goodrich, Somerville, Mass.; G. S. Greene, Jr., New York; George S. Greene, Morristown, N. J.; C. R. Grimm, Philadelphia, Pa.; Bernard R. Green, Washington, D. C.; A. Gottlieb, Chicago, Ill.; Edward W. Howe, Boston, Mass.; W. J. Haskins, Charles M. Harris, Clemens Herschel, Charles Warren Hunt, William R. Hutton, New York; Lewis M. Haupt, Philadelphia, Pa.; C. B. Hunt, Washington, D. C.; Alfred E. Hunt, Pittsburgh, Pa.; Robert W. Hunt, Chicago, Ill.; B. M. Harrod, New Orleans, La.; W. H. Jaques, South Bethlehem, Pa.; A. Langstaff Johnston, Richmond, Va.; J. M. Johnson, Louisville, Ky.; Paul S. King, Buffalo, N. Y.; Thomas D. Lovett, Cincinnati, Ohio; Charles Macdonald, Henry C. Meyer, New York; Thomas H. McCann, Hoboken, N. J.; Mansfield Merriman, South Bethlehem, Pa.; Henry G. Morse, Wilmington, Del.; D. E. McComb, Washington, D. C.; James C. McGuire, Ellicott City, Md.; E. T. D. Myers, Richmond, James D. Moffet, Radford, Va.; William Metcalf, Pittsburgh, Pa.; M.

W. Mansfield, Indianapolis, Ind.; George S. Morison, Chicago, Ill.; John MacLeod, R. Montfort, Louisville, Ky.; Gouv. Morris, Johnson City, Tenn.; George B. Nicholson, Covington, Ky.; Henry G. Prout, New York; Milnor P. Paret, Baltimore, Md.; George H. Paine, Swissvale, Pa.; George H. Pegram, St. Louis, Mo.; Alfred Petry, Covington, Ky.; Arthur Pew, Savannah, Ga.; Joseph R. Richards, Boston, Mass.; Percival Roberts, Jr., Philadelphia, Pa.; Walter P. Rice, Cleveland, Ohio; Benjamin Reece, Chicago, Ill.; Robert L. Read, James Ritchie, Cincinnati, Ohio; Henry B. Seaman, Frank W. Skinner, New York; Pemberton Smith, Albany, T. Guilford Smith, Buffalo, N. Y.; Oberlin Smith, Bridgeton, N. J.; C. C. Schneider, Philadelphia, Pa.; Addison M. Scott, Charleston, W. Va.; Robert B. Stanton, Denver, Colo.; John Thomson, Calvin Tomkins, New York; W. W. Thayer, John C. Trantwine, Jr., Philadelphia, Pa.; Edwin Thacher, Louisville, Ky.; John G. Van Horne, New York; S. von Gemmingen, Newport News, Va.; William Watson, Boston, Mass.; N. J. Welton, Danbury, Conn.; A. M. Wellington, William E. Worthen, New York; Charles D. Ward, Oswego, N. Y.; L. B. Ward, Jersey City, N. J.; H. D. Whitecomb, Richmond, Va.; George Y. Wisner, Detroit, Mich.; Fred. C. Weir, Cincinnati, Ohio; J. S. Walker, Nashville, Tenn.

Sixty-one ladies of the families of members accompanied them at the Convention.

BUSINESS MEETING HELD DURING THE ANNUAL CONVENTION OF THE SOCIETY, AT OLD POINT COMFORT, VA., JUNE 8TH-13TH, 1892.

FRIDAY MORNING, JUNE 10TH, 1892.—MENDES COHEN, President Am. Soc. C. E.—Gentlemen, it has been provided by the Constitution that the general business meeting of the Society shall be held during the Annual Convention at a time to be settled upon. The hour of 10 o'clock this morning was named for this purpose; it is a little after that, but the Convention will now come to order in general business meeting. I declare the meeting open.

MR. CHARLES B. BRUSH.—At the last Convention a resolution was passed in relation to the manner of appointing a Nominating Committee. I would like to have that resolution read.

The Secretary read the resolution.

MR. BRUSH.—I move that a committee of three be appointed by the Chair to canvass the ballots; to receive any ballots that have not been yet cast, and to report to this Convention at 11 o'clock the result of that canvass.

MR. C. W. HUNT.—Make it half-past eleven.

MR. BRUSH.—Half-past eleven.

THE PRESIDENT.—Gentlemen, you have heard the resolution offered by Mr. Brush; all those in favor please say aye. (Carried.)

The Chair appointed as such committee Messrs. Haskins, Bott and McComb.

Colonel WILLIAM P. CRAIGHILL.—Before the business of the Convention proceeds, I have a resolution which I will read, with your permission; it is not in the programme, but it is one that I think will receive unanimous consent. Have I that permission?

The PRESIDENT.—Proceed, sir, if you please.

Colonel CRAIGHILL.—*Resolved*, That we wish to put on record our pleasure in having with us at this Convention of our Society our venerable Past President, General George S. Greene, who has been so long distinguished as a soldier and an engineer. We offer him our sincere and respectful congratulations and our heartiest wishes for his long-continued health and happiness in coming years. (Applause.)

I wish to say just one word to express my own individual pleasure in having upon the platform our distinguished Past President. As an American soldier, an American engineer and an American citizen, the last of which I consider the proudest title of all, I am happy in having his name upon our roll.

Mr. BRUSH.—I second the motion and call for a rising vote.

The PRESIDENT.—Gentlemen, you have heard the resolution offered by Colonel Craighill, which has been seconded by Mr. Brush; those in favor of the adoption of the resolution will please signify the same by rising. (Unanimously adopted.)

General G. S. GREENE.—Gentlemen, I am very grateful for this compliment. I have no words to say to you at this time except to tender to you my sincere thanks.

The PRESIDENT.—Members of the Society who have not thus far balloted for members of the Nominating Committee from their respective districts now have an opportunity of doing so. It is particularly well that the members should have their ideas as a guide in selecting a proper committee. * * * Are all the ballots in? Gentlemen, the vote is about to close. * * * Are all the ballots now in? The Chair declares the ballot now closed.

Gentlemen, we are now assembled in business meeting without any special arrangement of business except at your discretion and your call; the whole matter of the proceedings of the Convention is in your hands.

Colonel CRAIGHILL.—You did me the honor to appoint me the chairman of the Committee of Arrangements; in that capacity I have a resolution here to offer, if I am in order. It was prepared by Major Myers:

Resolved, That the thanks of the Society be presented to Mr. R. B. Cook and other officers and agents of the New York, Philadelphia and Norfolk Railroad Company, for the courtesies extended by them on the 9th instant. (Carried.)

Colonel CRAIGHILL.—In the printed programme occurs the following

paragraph: "It is hoped that arrangements may be made on the return trip to stop off at Charleston," etc. I hope I may be excused for referring to a personal matter. I must distinguish between myself as a United States Engineer and as the Chairman of the Committee of Arrangements. I am now speaking as the Chairman of that Committee. I have seen the work on the Great Kanawha, and I know it is an interesting work. The Resident Engineer who has charge of that work is present—my friend, Mr. A. M. Scott, who is too modest to speak for himself. I may say that it is a very successful work, and I am exceedingly anxious that the members of this Convention should see it. I had a conversation with the Chief Engineer of the Chesapeake and Ohio Railroad who offers special inducements to any members of the Convention who wish to go to the Kanawha. Those who are returning by the Chesapeake and Ohio have but one-third fare to pay; the Chief Engineer, as agent of the road, gives me authority to say that these tickets for one-third fare will permit members having them to stop at Charleston for this purpose, and then take some other train when they wish to go on. If a sufficient number will go upon the trip, he will furnish a special train; if not enough to fill a special train, he will furnish a special car upon a regular train; and to those who wish to go and return, he will give a free pass to go and return when they feel like it. I hope many members will avail themselves of the opportunity. Mr. Scott has to make arrangements for transportation on the Kanawha, so we will be glad to know, as soon as possible, how many will take advantage of this offer. The train may stop at the upper part of the river, where the improvement begins; but it is not necessary that the members shall see the whole work. There is a lock at each site, but some of the dams are fixed and some are movable. The movable dams will be of great interest, I believe, to this body of engineers; they were the first that were constructed in America. The time spent on the Kanawha may be reduced to three or four hours.

The CHAIR.—You have heard how clearly the distinguished engineer of the Kanawha improvements has merged his identity in that of Chairman of the Committee of Arrangements, and I can also promise you that if you visit those works you will see a great deal to interest you.

Mr. BRUSH.—I move that the Local Committee be requested to prepare resolutions for action by this Convention at its final meeting, acknowledging the various courtesies extended by this Convention and especially the extraordinary courtesies extended by the officers of the United States Army and Navy in this locality. (Carried.)

Colonel CRAIGHILL.—I wish to offer a resolution in reference to the resolution which was informally adopted in reference to our distinguished Past President. The motion is that a copy be transmitted to him officially, with a letter from the President of the Society. (Seconded and carried.)

The CHAIR.—Mr. Secretary, if you have any announcements to be made, I think they ought to be made now.

The Secretary made several announcements as to the future programme of the Convention.

Mr. BOGART.—I have been requested by the Board to make an announcement as Treasurer of the Society.

I suppose the members have received, recently, a circular calling their attention to the fact that the Society has, at the request of the management of the World's Fair at Chicago, assumed the direction of that section of the Congress on Technical and Scientific subjects which is devoted to Civil Engineering, and that, in connection with the World's Fair, the four national engineering societies have agreed to maintain at Chicago an engineering headquarters; also, that the amount which it is considered this Society should raise for that purpose is not less than than \$3 000. I am instructed to announce the amount which has been contributed, which is \$1 534 50, and to suggest that the total sum of at least \$3 000 is needed.

Mr. R. W. HUNT.—If you will permit me, in connection with Mr. Bogart's announcement, to state very briefly the status of the proposed engineering headquarters. I venture to do so as a member of the Executive Committee in charge at the present time, representing the American Institute of Mining Engineers on that Committee. It is very necessary that the Committee should feel confidence in having the money which it is evident will be needed to carry out the object of the headquarters. I presume your circulars fully explained what is proposed to be done; but as it is necessary that a building or suitable rooms should be secured this year, we ought to know where the money is coming from and how much we shall have, and surely this Society ought not to have any difficulty in contributing so small an amount as \$3 000. It is not necessary that the money should be paid at once, but the pledge will be sufficient.

The PRESIDENT.—It is certainly to be hoped that the responses of the members to the appeal will be made without delay. It is so evidently necessary that the Committee on the subject should know what they can do, that any delay now will become embarrassing.

Mr. C. S. CHURCHILL.—Several of the members have spoken to me about the trip to-morrow, to the wharves. It is proposed that any members who wish to go will leave here at 9 o'clock to-morrow morning, arriving in Norfolk at 10 o'clock, and transportation will be furnished going and returning. The plan was originally mentioned as a part of the programme; but, other arrangements having been made, this is outside of the regular programme.

The PRESIDENT.—The Chair is requested to make a brief statement in behalf of the Board of Direction which has had brought to its notice a certain circular in regard to the publications of the Society.

It is only necessary to say that the circular of the Publication Committee, which has been issued and duly sent out by the Secretary of the Society, is, so far as this Convention is concerned, suspended, and the whole matter is placed under the future consideration of the Committee and of the Board of Direction. So far as the present Convention is concerned, its restrictions are entirely suspended.

MR. A. M. WELLINGTON.—Does that mean that all the papers that have been presented here are open to publication in full by technical journals.

THE PRESIDENT.—It means that the circular as such is entirely withdrawn, and that the usual practice which has prevailed heretofore, which practice has been so well understood, and, I think, generally respected, by the technical journals, obtains as heretofore.

MR. THEODORE COOPER.—Mr. President, I think that this Convention should take some action on this matter. I therefore move the approval of the withdrawal of that circular by this Convention, simply to show you the feeling of the members of the Society. I think it is proper to bring forth that feeling. I have talked with many members, especially the older ones, about this circular, and they have felt very strongly that it was a large step backwards. I therefore move—*Resolved*, That this Convention approve of the withdrawal of that circular.

MR. WILLIAM METCALF.—Mr. President, I rise to second the motion. I cannot help feeling, and so far as I have been able to discuss the matter with any members present here, I found the feeling to be universal, that after any paper has been offered to the Society, and has been read and submitted to the discussion of the members, that then the larger and the fuller the publication and the wider the dissemination, the better all round. It can do no possible harm to the *Transactions*. We feel when we get the *Transactions* that they are simply a permanent record of the proceedings. When we see that a paper has been published, not only here, but all over the world, we feel that it has an added value. It is the only legitimate way the member has to advertise himself and he is entitled to that.

MR. DESMOND FITZGERALD.—I heartily endorse everything that has been said and the idea that has been brought forward, but I also hope that the resolution will not pass or that it will be withdrawn, for the reason that the action on the circular was taken through the inquiries and after a great deal of hard work that was put in by the Chairman of that Committee. The Chairman is not present at the Convention and has no opportunity to defend his action. I am sure, as a member of that Committee who knew nothing, however, about this action at the time it was taken, I can assure the Convention that the proper thing will be done; it is not necessary to pass this vote.

MR. CHARLES MACDONALD.—Mr. President, I hope the resolution

will pass. It seems to me that we ought to place upon record our understanding of what the published *Transactions* of this Society really are by a vote upon this resolution. If they are merely an expression of an individual opinion that is one thing; but if they represent an exhaustive investigation of a question touched upon, that is another. If the latter view obtains, as seems possible, the largest discussion possible can only be obtained by the largest possible publicity. I think that the practice heretofore in other scientific institutions, especially the Institution in London, has been rather to invite such publication. A paper is printed and published in the technical papers and is disseminated all over the world, in fact, inviting discussion, and the final discussion which goes upon record and goes into our literature is the mature consideration of the whole subject touched upon by the individuals who have read that paper. That can never be obtained by restricting discussion to what may come before our own body. I therefore am quite in favor of the motion of Mr. Cooper.

MR. COOPER.—Mr. FitzGerald seems to misunderstand the resolution. It is not intended in any way to reflect upon any one. The fact that, as he states, the Chairman of the Committee is not here, makes it more important that the Chairman, not being here, should know the feeling of this Convention. This circular, Mr. President, has been withdrawn, as you state. If there is any reflection upon him it has been done by a higher body. We simply wish to express publicly our approval of the action of the Board. I think it is desirable, simply here as we are, to let every member know how we feel, and I believe that every American engineer feels that we should be broad and liberal and not narrow and small.

If I may touch upon one other subject that tends in the same direction, I would like to speak a few words. Some years ago—eight, ten, twelve years ago—I was a member of the Board with some other members here who have gray hairs. At that time the matter came up as to whether we should furnish our publications to schools that could not afford to pay for literature of any kind. The matter came up on the application of some man in Mexico, who stated that he had only four or five pupils, they had no library, no text books, etc., and would not our Society send the publications to them. The Board considered the matter and resolved that not only that little school in Mexico, but every civil engineering school in America which had a claim to being an engineering school should have our *Transactions* free.

That has been done up to the present time. I understand now that up to the first of January they have been informed that they could have them, by paying the usual price. Now, it makes my blood boil, sir, and I believe it would make anybody else's, if we cannot afford to put forth to the future engineers of the country our literature, at what cost?—at 5 cents a month! That is about what the extra publi-

cations would cost. After the first imprint, anything further simply means the cost of paper and press work. Now, if there are forty or fifty engineering schools in the country, what does that mean? Two dollars and a half a month. Is the American Society of Civil Engineers going to economize \$2 50 a month and put itself in such a position as this? Are we going to be liberal and broad, or are we going to narrow ourselves down to a trade school?

The PRESIDENT.—The Chair wants to state right here that he is not aware that he has been absent from any meeting of the Board since he was elected to the Presidency [Applause] and he supposed that he knew of everything that had transpired in that time. If any action has been taken by the Board which cuts off the fullest, the widest distribution of its journals, a matter which the present incumbent of the Chair has advocated most strongly—if any such action has been taken by the Board, the Chair must confess that he is entirely ignorant of it at this moment and learns of it with much surprise.

Mr. JOHN BOGART.—The action which has been spoken of in regard to sending our publications to engineering schools, charging engineering schools with publications, was taken last year before the President was in office; but there was such action taken.

Mr. FITZGERALD.—Mr. Cooper has conveyed the sentiments of my heart entirely; but simply as a matter of courtesy to the Chairman of the Committee of which I am a member, who has taken a great interest in the matter, I hoped that the motion would not be passed. With the sentiment of Mr. Cooper I agree most cordially.

The CHAIR.—The Chair may say, in further explanation, which he feels warranted in doing, that Mr. FitzGerald has indicated that, owing to the absence of the Chairman of the Committee, discussion has not taken wider form; that the Board itself, as a whole, was unaware, the President of the Board was unaware, of the issuance of that circular, and did not see it until after its issue. As a matter of fact, the President never saw it nor never heard of it until last evening. But the matter having been under discussion at some time back—some considerable time back—it was referred to the Committee with power. The action was taken by the Committee and the Board does not repudiate it, that it was taken by the Committee being with power, with ample authority. The Board gave its authority to the Committee in a certain direction; and, after the action was taken, it was not brought to the attention of the Board until now. It appears to the Chair that if the Convention should deem it suitable to drop the whole matter now, I think it will be the best action that can be taken. I think you may safely trust the matter where it is now. The Board, perhaps, acted unadvisedly some little time back, and takes the responsibility of its action.

A MEMBER.—Do you desire that resolution withdrawn?

The PRESIDENT.—No, I do not desire it to be withdrawn, but I only wish to say that a rectification will be made in any event.

The resolution of Mr. Cooper was then called for and carried.

Mr. BOGART.—Is there any news from the Committee authorized to canvass the vote?

The PRESIDENT.—Not yet. It has been suggested that the Secretary make some announcements, or that some announcement be made with regard to the entertainment of the visitors from the other side who may come over to the World's Fair next year.

Mr. BOGART.—I thought the circular gave that.

The PRESIDENT.—I think the circular gave it very fully, but it was thought that this was an occasion on which something more might be said. I don't know that anything further is needed than to say to the membership, not to be uneasy. We want to have liberal contributions for the purpose of taking care of the members of the profession in Chicago and doing something to acknowledge the kindness received from our brothers and friends from the other side, and send them on their way rejoicing to see the sights. Later, if it should appear wise that other steps should be taken by the Society, the Board will advise you of what it deems proper to do, but we will have quite enough to do at the outset in taking care of them and sending them on to Chicago without bothering with too much formality in reception. The Society does not forget how its members were entertained on the other side, and your Board of Direction is not going to forget that, and at the proper time something shall be done worthy of the dignity of the Society. That is the sentiment of the Board, and the Board would advise you not to borrow any trouble.

Mr. A. FTELEY.—Mr. President, it seems to me that after what you have said, it might be well to tell the members of the Society just how we stand. You have a committee appointed now that is looking after those matters. This committee has met with the committees from other societies and it is only the absence of some of the committees which has prevented us from meeting with them all. We have had a meeting. I hope we shall have another and others, and I do not doubt we shall come to some agreement, but as Chairman of the Committee, I want to say we are at work and you will see the results very soon.

Mr. WELLINGTON.—As the Committee to canvass the ballots is not quite ready to report, I think a good many of the members will be interested in hearing from Mr. Hunt, who is the chairman of a committee on this subject, just what measures are proposed; whether there is to be a separate building and how maintained.

The PRESIDENT.—Will Mr. Hunt favor us?

Mr. R. W. HUNT.—I do not know that I can say much more than I briefly alluded to before. Assuming that the \$15 000 has been raised, it is proposed to take a house on which we have secured an option and

which, up to the present time, seems most desirable. It is situated within one square of the Auditorium Hotel on the lake front. We are to take at least three floors of it; it is convenient to the vessels and transportation, and within two blocks of it is the building in which the congresses will be held. It is in the center of the hotel region, and in every way commends itself. The idea is to have a permanent secretary or a general secretary who will be in authority during the exhibition, and who will give his entire time to the running of the headquarters. In that building he will have a corps of assistants who speak the various languages, as many as necessary, to be able to receive all visiting engineers, and see that they are suitably equipped with proper credentials for visiting the different manufacturing and other points of interest throughout the country. In fact, it is proposed to do very much what was done by the Mining Engineers in Philadelphia during the Centennial.

In addition to that, at the Exhibition proper, there will be a bureau of information so that all visitors can receive such information as they may desire, as to direction of exhibits and the many small details which are so valuable and which save so much time. We want this to be the engineering home, not only of the Civil Engineers, but of the different engineers of America who participate in its establishment.

A MEMBER.—What is the whole sum required?

Mr. HUNT.—Three thousand dollars is the sum required from this Society; a number of other engineering societies participate. The other societies are the Engineers' Club of Philadelphia, the Western Society of Engineers, the Engineers' Society of Western Pennsylvania, the Civil Engineers' Society of St. Paul, and others. At the last meeting of the General Committee the principal question for discussion was as to the admission of various other societies to the building. The Executive Committee was given authority in the matter to use their best judgment as to the admission of any society which will make proper contribution, and whose objects and membership are distinctively engineering, but not to admit those which could not claim that status. That action related principally to some of the County Surveyors' societies and others which had applied; if these were admitted, it would be impossible to provide large enough headquarters.

The great point which is troubling us at the moment is the selection of the right man for the secretaryship. There are plenty of them; but they are busy men and are not willing to give up their time; however, I believe the emergency always produces the man.

Mr. A. P. BOLLER.—I would like to ask the Treasurer to what extent he has had responses?

Mr. BOGART.—I announced a few moments ago that we had received \$1 534 50. When I announced that a half an hour ago we had received 163 subscriptions; we have now 164 subscriptions, amounting to \$1 634 50; I have received a subscription of \$100 since that time.

Mr. FTELEY.—I do not believe the subject has been presented fully. When the first circular was sent, a good many members understood that there was no hurry in the matter. I believe at the annual meeting the subject was discussed and it was said that a new circular would be issued. There has been no time for the Treasurer to receive a response to the circular which has just been sent out. I don't doubt a great many more subscriptions are coming in. I could name now six individuals, including myself, who have not subscribed, and I have no doubt there are a great many others.

The PRESIDENT.—I think we can fill this interval by taking some action upon the matter of the recommendation of the Nominating Committee. The provision of the Constitution under which you will act reads as follows :

At the business meeting of the Annual Convention seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who, with the five last living Past Presidents of the Society, shall be the Nominating Committee. This committee shall present to the Board of Direction, on or before the first day of October ensuing, a list of nominations for the offices to be filled at the next annual election. These nominations shall be so made as to provide, with the officers holding over, a Resident Vice-President and six Resident Directors.

Now, at the last Convention there was presented and adopted the following resolution :

Resolved, That at least thirty days before the next Annual Convention the Secretary shall issue under the orders of the Board of Direction a blank ballot, endorsed "Nominating Committee" to all members of the Society, by districts, as adopted at this Convention. Upon opening the ballot at the next Convention, that Convention is requested to elect from each district one of the names presented from that district, and it is recommended that the ballots be limited to the three names having the highest number of votes in each district.

Presently the Committee which has the matter in charge will announce that District No. 1, up to District No. 7, recommends the following names. What action will this meeting take ? What disposition will you make of them, and how, by districts, will you proceed to the election of the several members ? It is for this meeting to decide that, and it is just as well to decide it in advance, to save time.

Mr. CROES.—I would suggest that when the names of the several members who have been nominated from the several districts be presented on the blackboard, as I believe they will be, that the several districts be taken up in their numerical order, and then a motion will be in order from any member of the Convention to name the member of the Nominating Committee from the first district ; then, that a vote be taken, *viva voce*. That a resolution be offered by some member of the Society that so-and-so from the first district be the nominee from the first district, and that a vote be taken upon that. You will have the names all before you and take the highest man ; that name is

offered to the Society, to be accepted or rejected, as the case may be. I do not intend this as a motion, but only as a suggestion.

The PRESIDENT.—Before making it as a motion perhaps the Chair might suggest; would not this be better? In the first place, this is a recommendation to this Convention without the least weight, and is not a law of this Convention; not a law of the Society. If you approve of the recommendation of the last Convention and adopt it, then this ballot, when it has been presented, will come up before you for your consideration. The Chair would suggest that if three names are presented, as is expected, then taking the names in their numerical order, the Chair put the question, "Those in favor of Mr. A will please rise, and stand while they are counted"; then the same for Mr. B, and the same for Mr. C, in which case each man will have his respective vote; whereas, if some one recommends by chance one of the three, and the vote is put, he will be apt to be elected irrespective of any others.

Mr. BOGART.—May I ask if the Secretary knows how large a vote there is?

The SECRETARY.—The number cast from District No. 1 is forty-nine.

Mr. BOGART.—Very well; I think we have some forty-one members from District No. 1 here, and I don't know as I propose to be guided by the other forty-nine members. Mr. Croes' suggestion, as I understand it, commits us to the choice of the forty-nine who have voted.

Mr. CROES.—If those gentlemen are voted upon, as being the choice of a number of members, you can vote against them, and, after that, you can make any suggestion. The idea was rather to crystallize the thing and find out the views of the Convention. I suggest that of the forty-nine members of the First District probably forty-five are here; a number of them can vote again. I have no feeling and no desire in the matter. I made the suggestion because the President asked. Mr. Bogart has objected to something without making any suggestion that I can see.

Mr. COOPER.—If I understood your suggestion, it has some unpleasant features. Assuming that there are three names presented from District No. 1, what would seem to be the harmonious method of proceeding is to ask this Convention if it approves the nomination of the man who has the highest number of votes. If this Convention does so approve, I think that a vote should not be taken on the other names on District No. 1, because that would put the other gentlemen in an unpleasant light. For instance, suppose you say, "Do you approve of Mr. Cooper?"—I wish to say that I have gone round asking people not to vote for me—you put me in a very awkward position. Let us take the highest name from each district and present to this Convention and ask if they approve or do not approve; if they approve of the man that has the highest vote, let us not consider the others at all.

General GREENE.—I believe there are only seventy or seventy-one votes cast out of seven hundred members in the whole Society; I don't know whether the whole number of members have been notified.

The PRESIDENT.—They have been notified, but have not all voted.

General GREENE.—It is a very small expression of that vote.

Mr. R. W. HUNT.—If in order, I move that this Society, in the nomination and election of the Nominating Committee for this year, be governed by the recommendation of last year's Convention, with all its provisions, which are that the candidates receiving the highest number of votes——

The PRESIDENT.—Upon opening the ballot, this Convention is requested to elect from each district one of the names presented from that district, and it is recommended that the ballots be limited to the three names having the highest number of votes in each district.

Mr. HUNT.—I move, then, that we govern ourselves in the selection of the Nominating Committee this year, by that resolution of last year's Convention, and that the selection shall be the one from each district receiving the highest number of votes.

Mr. CLEMENS HERSCHEL.—The action under the plan outlined by the last Convention has not appeared to me in a very favorable light as the proceedings have gone on, and I would prefer that this Convention should maintain the most complete liberty of action until that blackboard is turned around. I should regret that a blind action be taken at this time.

Mr. FTELEY.—I hope that the suggestion of the Chair will be carried out; that the three names shall all three be voted on by the whole Convention in order, as they have received the highest number of votes. My reasons are, that in former years the Nominating Committee has been appointed without receiving any notification; often the members of the districts themselves do not want them. This is cumbersome, I admit; but while in force, let us follow it. If, in proposing members from a certain district, they nominated the candidate from this district, then I would be satisfied that the man receiving the highest number of votes in that particular district should be the man; but as this Nominating Committee is to select men from the whole country, I think the members should say something in the matter, irrespective of whether he has received the highest number of votes from his own particular district.

Colonel CRAIGHILL.—I desire to call attention to the peculiar situation in which we are now placed. I feel quite confident it has not occurred to many members of the Convention, but the elections that are to follow the action we are about to take, are the most important that this Society has ever taken from one point of view. We know that the centennial year is about to begin, and that this Society wants its representatives, then, to be the best men they can put to the front.

They should be peculiarly live men, men distinguished as engineers, and who have the time to devote to the duties which will devolve upon them. More particularly is this true of the position of President, because he is to be the representative of the Society in New York and in Chicago. For these reasons, I think extreme care should be exercised, in the first place, in the choice of the Nominating Committee, in order that the suggestion of officers by them may be the very best.

General GREENE.—I think before this action is taken, it would be better to have that board turned around.

Mr. BOGART.—I think so too, decidedly. I don't propose to commit myself.

The PRESIDENT.—It will not be forgotten by the membership that this matter was left entirely unprovided for in the new constitution, because it was felt that the utmost freedom must remain with the Society itself in the selection of its officers. The Convention last year formulated this method, which it recommended to its successors. But you have got to define your own way of selecting this Committee.

Mr. FTELEY.—May I ask the Secretary to state whether he has heard from the seven districts.

The SECRETARY.—Yes, sir.

The PRESIDENT.—The vote of the seven districts is now being placed upon the blackboard.

Mr. R. W. HUNT.—Is not there a motion before the house?

The CHAIR.—Has the motion by Mr. Hunt been seconded?

(Seconded.)

Mr. D. FITZGERALD.—Is not this a good deal like the game of whist? What is the use of having a ballot at all if the matter is to be left wholly to our discretion here?

The PRESIDENT.—The action thus far, the Chair would explain, has been to carry out the resolution of the Society made a year ago. It is now, however, entirely competent for you, assembled here, to say whether this shall be further carried out. The question is upon the resolution offered by Mr. Hunt.

Mr. METCALF.—Will you please explain to the Convention that the passage of Mr. Hunt's resolution elects the Nominating Committee blindly.

Mr. R. W. HUNT.—I am satisfied just that way.

Mr. METCALF.—That elects a Nominating Committee without the Convention having any say.

The SECRETARY.—In one case there are seven or eight names with only one vote and no three highest.

Mr. R. W. HUNT.—Mr. Chairman, I object to the game being opened.

Mr. CHARLES B. BRUSH.—What is the resolution?

Mr. BOGART.—I move the report of the Committee be received, if it is ready.

A MEMBER.—There is a motion before the house.

The PRESIDENT.—Mr. Hunt, you have offered a resolution, which is before the Convention. Are you ready for the motion which will be called for unless it is withdrawn.

Mr. R. W. HUNT.—With the consent of the Convention, sir, I withdraw it. If the Committee is ready to report, that will be the business now before the Convention.

The PRESIDENT.—Will the Chairman of the Committee be good enough to read the names?

Mr. W. J. HASKINS.—The highest names?

MANY MEMBERS.—All ! All !

The PRESIDENT.—The Convention seems to desire that all be read.

Mr. WILLIAM E. WORTHEN.—Mr. President, cannot we read by districts and act on each district ?

The PRESIDENT.—Certainly, read the first district, and let us vote on that.

Mr. J. G. VAN HORNE.—Would it be well to state what States the districts contain ?

The PRESIDENT.—If the Secretary will be good enough to define the districts.

The SECRETARY.—District No. 1, New York City, and 50 miles around.

The PRESIDENT.—Now, read the report from District No. 1.

(Mr. Haskins read the report.)

The PRESIDENT.—Gentlemen, you have heard the result of the ballot as given for District No. 1. Will you be good enough, Mr. Haskins, to repeat once more the three names receiving the highest number of votes ?

Mr. BOGART.—There seem to be four.

Mr. HASKINS.—George A. Just, 9; A. Fteley, 8; Foster Crowell, 3; Charles Macdonald, 3.

The PRESIDENT.—Gentlemen, what is your pleasure ?

A MEMBER.—Are other names now in order ? Could we nominate still another name ?

The PRESIDENT.—It is entirely with the meeting what shall be done. You have simply heard the result of the vote for which there is no other authority than your toleration with regard to the views of the membership of that district.

Mr. HERSCHEL.—I move that the members present from District No. 1 gather in one corner of the room in the old time-honored way, and try to let daylight into this nomination, and present to the Convention one member from that district whom they recommend as the representative of the district.

Mr. COOPER.—Mr. President, I rise to oppose that motion, and I propose that this Convention adopt from District No. 1 the first four

names from which to select the candidate. This is not done with any purpose. I believe that the membership of our Society should have a vote and a voice in the Nominating Committee. The method of Mr. Herschel was very good as long as we had nothing better, but you, and perhaps all of us, remember where at one Convention there was a district represented by a single man, and yet that district was supposed to contain two hundred members. Is that better than taking the action of those who have voted and have, I suppose, voted with care? It seems to me there will be an interminable waste of time. My own action was a little awkward from having no knowledge of who might be nominated from any district. I only knew the man whom I voted for in my district—and it was not myself. But I do think we ought to recognize the written vote of all who voted; it is not fair to the absent to wipe that all out and go back to the old way.

MR. HERSCHEL.—My point is, that when forty-three members vote and barely manage to squeeze out nine votes for one man, and eight for another, and three for two, and one for several others, it is not a nomination in the proper sense of the word. While I would give the names on the blackboard great weight, yet they read to me as though no nomination had been made, and that was the reason I made the motion. I think nominating methods should nominate.

THE PRESIDENT.—There is nothing to prevent further nominations by this meeting; even if this course should be adopted, it will be quite in order to make further nominations,

MR. CROES.—I still, after hearing all the discussion, am of the opinion that the fairest and best and nicest method would be the one originally proposed by me, that the vote should be taken on the names in the order in which they stand; that it should be submitted to the Convention whether the one having the highest number of votes should be the man to represent that district, and if that is not approved, try the next.

MR. BRUSH.—How would we apply that to some of the districts.

MR. BOGART.—There are twelve votes cast in one district, and one vote for each man.

THE PRESIDENT.—There is no question before the meeting except the one—what will you do with the result of this ballot?

A MEMBER.—I move the nominations for District No. 1 be now closed, and that we proceed to the ballot. (Seconded.)

THE PRESIDENT.—It is moved and seconded that the nominations from District No. 1 be declared closed; those in favor of the adoption will please say aye. The ayes have it.

MR. BOGART.—No, you did not give us a chance to discuss.

THE PRESIDENT.—The ayes have it; the Chair has so decided it, and unless there is an appeal taken, the Chair declares that the nominations from District No. 1 are now closed.

Mr. HERSCHEL.—I would ask Mr. Croes to accept this amendment, if in order; instead of voting on each name separately, vote on the four names or on any other all at once, by ballot.

The PRESIDENT.—The Chair does not understand that there is any resolution now, by Mr. Croes or anybody else, before the meeting.

Mr. HERSCHEL.—I make that, then, as an original motion.

Mr. BRUSH.—That motion is out of order. In view of the resolution just passed, the nominations are closed.

Mr. BOGART.—The nominations are closed, but the voting is not closed.

Mr. BRUSH.—I think it is unfortunate, Mr. Chairman, that we should not have discussed that resolution. I move that we reconsider the vote. I think there is a much simpler way of doing this work. (Seconded.)

The PRESIDENT.—It is moved and seconded that the vote just declared adopted by which the nominations for the first district were declared closed, be reconsidered. All those in favor will say aye. Opposed, no. The ayes appear to have it.

Mr. CROES.—I call for a count.

The PRESIDENT.—Those in favor of a reconsideration of the vote declaring the nominations closed will please rise and stand until they are counted. There are 34 in the affirmative. Those opposed to the reconsideration will please rise and stand until they are counted. The reconsideration of the vote is not carried. There are 34 in the affirmative and 35 in the negative. The nomination is therefore declared closed.

Col. CRAIGHILL.—I move that Mr. Fteley be declared the member of the Nominating Committee from District No. 1. (Seconded. Motion put. Carried.)

The PRESIDENT.—Mr. Fteley is so declared a member of the Nominating Committee.

Mr. CROES.—Will the Secretary please read the next district?

The SECRETARY.—District No. 2, Canada and all foreign nations, New York State outside of District No. 1, New Jersey and Delaware.

Mr. Haskins read the report of District No. 2.

The PRESIDENT.—Are there any other names to be offered from District No. 2?

Mr. SEAMAN.—You did not put all the names on the board.

The PRESIDENT.—A larger board is being gotten ready. Further nominations are in order.

Mr. CROES.—I move the nominations be declared closed. (Seconded. Question put. Carried.)

Mr. HERSCHEL.—I move that Mr. Hayes be the nominee.

Mr. SEAMAN.—I move that Palmer C. Ricketts be the nominee.

Mr. THOMSON.—I move that Mr. Kuichling be the nominee.

Mr. CROES.—I rise to a point of order. It has been customary to have the nominations come from the district; I know one of the members who has spoken is not a member of the district.

The PRESIDENT.—The nominations having been now closed, the Chair deems that it must, in the absence of any definite form of voting, in view of the fact that under the resolution which has been suggested and which has now been adopted, call for a vote successively, and we will go over each of the twelve names and the man so named having the greatest number of votes will be declared the nominee, unless this meeting resolves otherwise.

Mr. BOGART.—Then we want the other two or three names on the board.

The PRESIDENT.—The meeting will now be asked to vote upon each one of these twelve names in succession, by rising and standing until they are counted and the result of the highest number of votes will be declared and the corresponding candidate will be declared elected.

Mr. FITZGERALD.—How are you going to tell whether a man votes twice?

The PRESIDENT.—We will trust to the honor of our members, I am sure. Those in favor of Mr. P. C. Ricketts as a member of the Nominating Committee will please rise and stand until they are counted.

Mr. WELLINGTON.—What Ricketts is that?

The PRESIDENT.—Palmer C. Ricketts, of Troy. Mr. Ricketts has 33 votes.

Those in favor of Robert Cartwright.

Those in favor of Sandford Fleming, 1.

Those in favor of E. Knichling, 2.

Those in favor of Robert H. Thurston, 4.

Those in favor of Edmund Hayes, 2.

Those in favor of Calvin E. Brodhead.

Those in favor of W. B. Coggeswell.

Those in favor of E. P. Hannaford, 4.

Those in favor of Horace Andrews.

Those in favor of T. G. Smith.

Those in favor of A. J. Swift.

Mr. HASKINS.—Mr. Palmer C. Ricketts has received 33 votes, being the highest number; the total number of votes cast is 46.

The PRESIDENT.—It has been suggested to me by Past President Greene, and the point appears to be quite well taken, that the 33 votes cast in favor of the first-named candidate may not be a majority of this meeting, while it is much the largest vote that has been cast.

Mr. SEAMAN.—It is a majority of the votes cast.

The PRESIDENT.—It is suggested that it may be a minority of the meeting; the vote is therefore announced, and it may still be with the meeting to declare.

Colonel CRAIGHILL.—I move that Mr. Ricketts be declared the member of the Nominating Committee from District No. 2. (Seconded. Question put and carried.)

Mr. FITZGERALD.—I now move that the nominations be closed for District No. 3, and that Mr. John R. Freeman be declared the nominee.

Mr. R. W. HUNT.—I respectfully object ; I hope the gentleman will not couple the two motions together. I am not opposed to it at all, but we had better avoid that sort of business.

Mr. FITZGERALD.—I will withdraw the latter portion of my motion. I move now that the nominations be closed for District No. 3.

The PRESIDENT.—It has been the practice to announce the district ; the Secretary will announce the district.

The SECRETARY.—Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island.

Mr. COOPER.—I would like to make one suggestion ; I move that all the nominations be closed, unless there be a special request for any name.

Mr. FITZGERALD.—I accept the amendment.

The PRESIDENT.—It is moved and seconded that all nominations be declared closed, unless the Convention wishes otherwise. (Motion carried.) All nominations are now declared closed. Will you proceed with District No. 3 ?

Colonel CRAIGHILL.—I move that Mr. Freeman be declared the member of the Nominating Committee from District No. 3. (Seconded and carried.)

The CHAIR.—Mr. John R. Freeman is declared the member of the Nominating Committee from District No. 3.

The SECRETARY.—District No. 4 includes Pennsylvania, Maryland, and the District of Columbia.

Mr. CHARLES DAVIS.—I move that Mr. Thomas H. Johnson be declared the member of the Nominating Committee from District No. 4. (Seconded. The Chair put the vote.)

The PRESIDENT.—The Chair cannot decide ; those in favor of the adoption of Mr. Johnson's name as the member from that district will please rise. There are 38 in favor of Mr. Johnson. Those who are opposed to the selection of Mr. Johnson will please rise. There are 15 in the negative. Mr. Johnson is declared the member of the committee from District No. 4.

The SECRETARY.—District No. 5, Michigan, Ohio, Indiana, Illinois and Wisconsin.

A MEMBER.—I would not have voted the last time if I had known what others were named.

Mr. WELLINGTON.—I would like to suggest, not having any interest in the question, but as the votes are very scattering, and the majority for any one candidate is small, it appears to me that the vote should

be taken on the first three candidates in alphabetical order. In this particular case Mr. Johnson has 7 votes and Mr. Rodd 4. I know Mr. Rodd, and think he would be a very competent member of the committee, and it seems just that all should have an equal chance.

The PRESIDENT.—It appears to the Chair that you should vote for each of the three having the highest number, give them a vote. Unless otherwise ordered, that will be the course pursued, as it was in the second district. This is District No. 5. There is one candidate with 4 votes, one with 3 votes, and three with 2 votes each. The Chair will put the question upon each one of the five names, unless the Convention otherwise order. The question will come first upon Mr. G. B. Nicholson. Those in favor of Mr. Nicholson's being a member of the Nominating Committee will please rise. Mr. Nicholson has 43 votes.

Those in favor of Mr. Strobel. Mr. Strobel has 7 votes.

Those in favor of Mr. G. H. Benzenberg. Mr. Benzenberg has 5 votes.

Those in favor of Mr. Robert L. Read.

Those in favor of Mr. F. C. Osborn.

There are 55 votes cast, of which Mr. Nicholson has 43. Mr. Nicholson is therefore declared the member of the Nominating Committee from District No. 5.

Mr. R. B. STANTON.—If I am not mistaken, I am the only representative of the next district here in this Convention; if I am wrong, I would like to be corrected. In the election for the last district I was certainly heartily in favor of the election of my old superior officer, Col. G. B. Nicholson. But probably there are not many here who are acquainted with many of the nominees for the next district. I request that the method carried out in the last vote passed shall not be changed, but that the members here will pay a little attention to the suggestion of a member from that district, that they do not vote for the first man that is put up. I desire to see Mr. John C. Bland put upon that committee.

Mr. SEAMAN.—There are some of the Eastern members who are pretty well acquainted with Mr. Pegram.

The SECRETARY.—District No. 6 consists of Minnesota, Iowa, Missouri, Kansas, Nebraska, North and South Dakota, Montana, Wyoming, Colorado, Utah, Idaho, Washington, Oregon, Nevada and California.

The PRESIDENT.—There is one candidate with 5 votes, one with 3, and seven candidates with 2 votes each. The Chair will put the question upon each one of the nine candidates. Those in favor of Mr. Geo. H. Pegram being the member of the committee will please rise and stand until they are counted.

Mr. JOHN THOMSON.—Mr. Robert Moore who is on the list, is already a member of the Board of Direction.

The PRESIDENT.—Then Mr. Moore cannot be a candidate.

Mr. FTELEY.—Is it in order to nominate another name?

The CHAIR.—All nominations have been closed, sir, unless the meeting determines otherwise.

The vote for Mr. Pegram is called for again. Those in favor of Mr. Pegram will please rise again and stand until they are counted. The Secretary records 27 votes.

Those in favor of Mr. J. C. Bland. There are 24 votes for Mr. Bland.

Those in favor of Mr. James Dun. There are 11 votes for Mr. Dun.

Those in favor of Mr. V. G. Bogue. There are 6 votes in favor of Mr. Bogue.

Those in favor of Mr. Rundlett.

Those in favor of Mr. Bontecou.

Those in favor of Mr. H. S. Huson.

Mr. Pegram received 27 votes; Mr. Bland, 24; the others, a much smaller number. Mr. Pegram has not, however, received a majority of the vote of the members present.

Mr. VAN HORNE.—I move that Mr. Pegram be declared the member of the Nominating Committee from District No. 6. (Seconded.)

The PRESIDENT.—It is moved and seconded that Mr. Pegram be declared the member of the Committee from the Sixth District.

Mr. COOPER.—Mr. President, I would like to make a remark. Mr. Pegram, Mr. Bland and Mr. Dun are all excellent members of the Society, any one of whom would make an excellent nominee; but, living in New York, I want to say one word more. Mr. Bland and Mr. Pegram are Eastern men; they belong, or have, until very recently, in the East. Mr. James Dun has been a Western man; he has built more miles of railroad, perhaps, in the West than any other man. I have known him as an excellent professional man for thirty years. It seems to me we want a man who represents that district, and Mr. Dun is certainly that man; he belongs in the district. Mr. Pegram and Mr. Bland have only lived in that country for a few years—two or three, perhaps, at the most; both came from the East to the West. They don't represent the district.

Mr. MACDONALD.—I wish to second the remarks made by Mr. Cooper in as strong language as I can command. Mr. Dun is certainly a representative man from that district, for the simple reason that he has worked himself up to an engineering position—an independent engineering position—by the most careful professional work. He has had no one but himself to rely upon. He began as an engineer in charge of some work that the St. Louis and San Francisco Railroad were doing; it was, at that time, almost a bankrupt organization. He accomplished his work most thoroughly, and was most successful in

bringing the roadbed up to an excellent condition, and he became known as an engineer of ability throughout the country. He was so much thought of there that, when a reorganization was had of the road by the corporation controlling it, Mr. Robinson selected Mr. James Dun as the Chief Engineer of the great corporation, extending all the way from Chicago to the other side of the country. While Mr. Pegram, too, has accomplished much, as have, I have no doubt, the other gentlemen (I have not the pleasure of their acquaintance), I have not the slightest hesitation in saying that Mr. Dun heads the list as a representative Civil Engineer from that district.

MR. COOPER.—I move that Mr. James Dun be the candidate from that district.

THE PRESIDENT.—The question before the Convention is, that Mr. Pegram be declared the member elected. It was to that question that Mr. Cooper spoke; so, that, the question that comes before the meeting is—Shall Mr. Pegram be declared the member of the Nominating Committee from District No. 6? The vote must be taken upon that first. Those in favor of Mr. Pegram being a member of the Committee will please rise. There are 13 in the affirmative.

Those who are not in favor of Mr. Pegram being declared the member of the Committee will please rise. There are 40 in the negative to 13 in the affirmative. Mr. Pegram is, therefore, not declared the member of the Committee.

MR. COOPER.—I now move that Mr. James Dun be the candidate from that district.

MR. SEAMAN.—Before we go further, I would like to ask the Chair how the votes Mr. Pegram received on the first ballot compared with the last.

THE PRESIDENT.—It seems to be unnecessary to go back to what was done before the vote was declared. It was the result of a certain balloting; we cannot take up that question now, unless the Convention itself desires.

MR. SEAMAN.—If Mr. Pegram receive the majority of votes cast on the first ballot, he was elected.

THE PRESIDENT.—This meeting has at no time yet determined how any one shall be elected until the moment of his election came. The meeting took particular pains to reserve in its own hands until the last moment the declaration of its views. The Chair must so decide.

The question now comes up on the name of Mr. Dun. Those in favor of Mr. Dun being a member of the Committee from the Sixth District, please rise and stand until they are counted. There are 58 votes in the affirmative.

Those opposed to Mr. Dun being a member of the Committee, etc. None opposed.

The Chair decides that Mr. Dun, having fifty-eight votes in the affirmative, is declared the candidate from the Sixth District.

The SECRETARY.—The Seventh District is Virginia, West Virginia, North and South Carolina, Georgia, Alabama, Mississippi, Louisiana, Florida, Texas, Tennessee, Kentucky, Indian Territory, New Mexico, Arizona and Arkansas.

Mr. HASKINS read the report from this district.

Mr. CROES.—The name of Mr. Robert Moore was read and also the name of Mr. G. B. Nicholson. Mr. Robert Moore is a member of the Board of Direction and Mr. Nicholson has already been elected to the Committee.

A MEMBER.—I move that Mr. John B. Atkinson be declared the candidate from the Seventh District.

Mr. STANTON.—Mr. Nicholson's name appears in the list in each district: he has been elected a member of the Committee from the Fifth District; I understand he does not live in the Fifth District. If the members want Mr. Nicholson on the Committee they will have to elect him from the Seventh District.

The PRESIDENT.—Has Mr. Nicholson been elected from a district where he does not properly belong?

Mr. STANTON.—This is as I understand it. He has been elected from a district which represents Ohio; Mr. Nicholson lives in Kentucky.

The PRESIDENT.—It appears to be one of those conditions which so often prevail among members of our profession, the having their office in one place and residence in another, but it does not do to draw the line too closely, but to follow whatever we have been in the practice of doing in the records of the Society, which, I believe, does place Mr. Nicholson in Kentucky. The fact that Mr. Nicholson's name appears in this district, does not affect the question of the four highest candidates. We will consider the name of Mr. John B. Atkinson. Those in favor, etc. Mr. Atkinson has 48 votes.

Those in favor of Mr. O. H. Landreth.

Those in favor of Mr. C. S. Churchill, 6.

Those in favor of Mr. W. W. Coe, 1.

There are 48 votes in favor of Mr. Atkinson.

Mr. R. W. HUNT.—I move that he be declared the member of the Committee from District No. 7. (Seconded. Motion put and carried.)

The PRESIDENT.—Mr. Atkinson is a member of the Committee. That concludes the appointment of the members of the Nominating Committee.

The business meeting then adjourned.

SATURDAY, JUNE 11TH, 1892, AFTERNOON.—The PRESIDENT.—The Society will please come to order. At first, this will be a continuation of the business meeting of yesterday.

The SECRETARY.—It is desirable that the Society meet in business session for a short time. It is necessary that we should receive from the different committees their reports.

The Standing Committees are as follows: First, a Committee on Uniform Standard Time. That Committee has made officially its final report, but it is continued for the purpose of making standard time more general in its use.

There is also a Committee on Units of Measurements. I have received a letter from Professor Egleston saying that he was going abroad and could not make a report at this time.

There is also a Committee on Impurities of Domestic Water Supply.

The PRESIDENT.—Is that report ready?

Mr. A. FTELEY.—No, sir. I announced at the last Annual Meeting that we thought it better to confer with a similar committee of the American Water Works Association. We found it necessary to wait for the Annual Report of that Association which, although not published, is known to me. Our Committee is now in communication with these gentlemen and I beg leave simply to report progress; although our motions have been slow so far, I hope that I may say that you will find they are sure, and that at the next Annual Meeting we shall have something tangible to report.

The SECRETARY.—The next Committee is the one on Standard Rail Sections, of which Mr. G. Bouscaren is chairman.

Mr. G. BOUSCAREN.—The Committee on Rail Sections has not decided yet when they can make a final report to the Society. They are making very notable progress in the information they are getting, and hope to make a final report at the next January meeting of the Society.

The SECRETARY.—The remaining Committee is the one on Uniform Methods of Testing Materials used in Metallic Structures, of which Mr. G. Bouscaren is also chairman.

Mr. BOUSCAREN.—The condition of affairs with the Committee on Tests of Materials is about the same as in the Rail Sections Committee. We made a report at the last Annual Meeting of the Society, and are still receiving discussions on that report. We hope to receive further discussion, and for that reason the Committee ask to be continued and to be granted further time.

The SECRETARY.—I would like to ask whether it is wished that any discussion should be printed?

Mr. BOUSCAREN.—I think it would be desirable to have them printed.

The PRESIDENT.—Is there any other business to be presented to the Society in this, its business meeting?

Mr. ROBERT B. STANTON.—Mr. President, if I am in order, at this business meeting I have a resolution to offer, and for the benefit of the President I have reduced it to writing. Before I read it, however, I hope the Society will indulge me for a moment or two while I explain my reasons.

This resolution comes from the Northwest, from the Sixth District. At the last Convention, held at Lookout Mountain, there was a resolution offered under which this Convention yesterday attempted to act, but signally failed. Now, the resolution that I propose to offer is intended to make such provision as to me seems best, coming from that far western country, to settle this question of appointing a committee to make the nomination for the officers of the Society. I have reduced that resolution to the form of a formula and I believe it is as simple as the one we discussed the other day $\frac{2\text{ }wh}{s+1}$, but, unfortunately, yesterday, the Convention—I suppose in honor of Mr. Crowell—introduced a variable quantity, and the election of every one of the members of the Nominating Committee was carried on by a different and variable process. I have gathered from the Society catalogue some few statistics to show you on what my resolution is based.

In the first place, District No. 6, which is scattered all over the Rocky Mountain region, has, if I have made no mistakes in adding up the names, 230 members, of which 35 have voted by letter ballot as a recommendation to this Convention, being about $15\frac{2}{10}$ per cent. of the members in that district. There was in the Convention yesterday, I had supposed, but one member from that district, but I now understand that there was one other. But in District No. 1 there are 360 members; 46 voted by letter ballot, or about $12\frac{1}{2}$ per cent. I think that a very good showing for District No. 6; the interest that they, scattered all over the mountain country, took in the last Convention. There were present yesterday 41 members from District No. 1. The recommendations of about $15\frac{1}{2}$ per cent. of District No. 6 were entirely overruled by the presence of so large a number from District No. 1, although only $12\frac{1}{2}$ per cent. of that district took any interest in the discussion or the vote. Now, what I propose is a remedy for this state of affairs.

But one other point before I read the resolution. The opposition that was expressed before the Society when the gentleman from District No. 6 was recommended on that committee—I mean the gentleman that I proposed—was that he was a carpet-bagger in the West, he had only gone there, I believe, from Philadelphia. Now, we are all carpet-baggers out there. There is nobody that belongs to that country who has been an engineer for a great many years in District No. 6. On the other hand, the man who was elected I honor as much as any of you, I know him personally, and I am a relative of his by marriage: but if this Society proposed, for the reason given by the gentleman who proposed him, and the gentleman who seconded him, to honor a man who had done great work in District No. 6, I am sorry that we did not nominate and elect my old chief, Jacob Blickensderfer, who was in every important work there twenty years before this Society was born.

Now, there is just one point which I shall not speak of, but which may come up in the discussion hereafter. What I propose is not going back to the old high tariff of years ago, nor to the free trade that we had yesterday, but this is a little McKinley bill with a reciprocity clause in it.

Resolved, That this Convention respectfully request the Board of Direction to select, at least ninety days before the next Annual Convention, three names of members of the Society from each of the seven districts as adopted at the Lookout Mountain Convention of 1891, as its recommendation of a list of names from which may be appointed seven members (one from each district) to form the "Nominating Committee," as provided in Article VII, Section 1, of the Constitution.

Resolved, That at the next Annual Convention this list of names be posted for inspection. And that said Annual Convention be requested to proceed to the election of the Nominating Committee in the following manner:

First.—The President to call for additional nominations from members of the Convention for each of the several districts in their order.

Second.—When all nominations are in for any one district, balloting to be carried on by means of written ballots, or by a rising vote, as the Convention may decide; balloting to continue until some one of the names presented shall receive a majority of all the votes cast.

Now, that is a proposition from the far West, and I hope that at least I shall have a seconder.

The PRESIDENT.—Is the resolution offered by Mr. Stanton seconded?

Mr. J. G. DAGRON.—I second it.

The PRESIDENT.—Is there any discussion upon the resolution; the question is before you? If not, the Chair will put the question.

Prof. W. WATSON.—It seems to me that a resolution at this time ought not to be proceeded with without the consent of the Society. It seems to me that this should be referred to the Society.

The PRESIDENT.—This is a meeting of the Society.

Prof. WATSON.—It should be approved in such a manner that all the members of the Society should have a knowledge of it. I should like to move that the resolution be considered. I mean that this be referred to the Board of Direction.

The PRESIDENT.—Do you make that motion, sir, as a substitute for the original resolution?

Prof. WATSON.—Yes, sir.

The PRESIDENT.—Is that accepted?

Mr. STANTON.—No, sir.

The PRESIDENT.—It seems not to be. The question will come up first upon the substitute. Is that substitute seconded?

Mr. R. W. HUNT.—I move that the discussion of this matter before the house, Mr. Stanton's resolution, should be postponed to the Annual Meeting, so that the membership may have an opportunity of knowing of it. I think the point well taken. Perhaps we were not satisfied with the free trade of yesterday, but do not let us make the

mistake of getting an equally complicated system which would be equally unsatisfactory, without at least fully understanding the situation before voting upon it. I would move that the consideration of Mr. Stanton's motion be postponed to the Annual Meeting. (Seconded.)

Colonel CRAIGHILL.—I think it would be exceedingly inexpedient for this Society, on such a short notice, to adopt such a radical change. It is entirely in accordance with my judgment that this should not be acted upon hastily. I agree with the gentleman who has just spoken, that it be referred to the Annual Meeting in January. It is not a thing that requires immediate action, because we have already acted, and similar action is not required for another year, so there is no reason why we should be so precipitate in acting now.

In addition to the reference of the matter to the Annual Meeting, it seems to me that knowledge ought to be given to the Society of the matter.

The SECRETARY.—All this discussion will be published in the *Proceedings*.

Mr. STANTON.—I only want to explain to Colonel Craighill that this is not offered as a plan, except as the resolution at the last Convention was, for trial one year. The Constitution simply provides that at the Annual Convention this Nominating Committee shall be elected, consisting of seven members who act with the Past Presidents of the Society. At the last Convention a resolution, after a great deal of discussion, was passed, recommending a certain course to this Convention.

Mr. GEORGE S. MORISON.—With Mr. Stanton's permission, I would like to have him read the resolution again.

Mr. STANTON.—I will do so; but it is simply a recommendation to the next Convention, over which we have no control whatever. The Constitution provides that the Convention shall elect that Committee, but it does not provide a method of doing it. The last Convention passed a resolution recommending to this Convention a certain method which we jumbled up so, that I don't know whether anybody knew what that recommendation was. I propose another method this year, hoping that it will be a better method, only for trial for a year. (Read the resolution again.) Now, just one more explanation, if you please. The plan that was suggested last year of every member receiving a printed ballot and recording his preference to the Convention, brought this one item out in two distinct districts. In District No. 1, the largest number of votes cast for one gentleman, being the largest number of votes that were cast in any district for any man, was for Mr. George A. Just, and yet, by the motion of one member of the Convention, Mr. Just was not allowed even a complimentary vote; his name was not brought before the Convention, although he had received the highest number of votes anywhere in any district. Now, if you will allow me the remark, I do not think that was just for George.

Mr. BOGART.—Now, in District No. 2, yesterday, there were only 12 members of the Society who took the trouble to vote upon the question of a proper person to be appointed upon the Nominating Committee. Twelve members sent in their written vote, and each of those twelve members sent in a different name, so that there were twelve names put upon the blackboard; when the President asked what was the first name, one name was selected, and the Convention being rather tired, it passed. I tried to ask why that should be selected as the first. Now, it would have been just as short, and there would not have been any question such as this, had it been done alphabetically, but the result was that somebody said “that is the first name, all those in favor of this name rise,” and all rose and nobody else got more than one or two votes. Therefore, I think there is a great deal in the suggestion of Mr. Stanton.

Mr. STANTON.—The last clause in the resolution covers the whole ground, if I understand methods of that kind. “Balloting to continue until some one of the names presented shall receive the majority of all the votes cast.” That would mean that a vote must be taken upon every name presented, which was not done yesterday.

The PRESIDENT.—The recollection of the Chair in reference to that particular District No. 2, where there were twelve names with but one vote each, is that, in that district, each and every name was presented to the Society for its rising vote; and if the Society, in its wisdom, determined to vote in favor of the first man who happened to be named, that was their lookout; they were called upon, in that particular instance, to vote upon each of the twelve names, and I think it was, even in that case, discovered that the first name had not a majority of all the votes, and again the question was put and it was carried then unanimously. I think that was the case in the Second District. However, the question now is upon the postponement of this resolution to the next general meeting of the Society in January.

Colonel CRAIGHILL.—The mover of the resolution says he has no objection to the postponement.

Mr. STANTON.—None whatever; it is simply to bring this before the Society to be settled.

Colonel CRAIGHILL.—My object was to have it thoroughly understood and not to pass anything hastily that we might have to go back from.

Mr. STANTON.—May I make a suggestion? It is simply that with this motion be connected a motion to furnish this resolution to the members of the Society all over the country; let them understand that it will come up at that time.

The SECRETARY.—It will go out in the printed *Proceedings*.

Mr. STANTON.—I am sorry to say that some members got the *Proceedings* and they are put on the shelf. I think some members will

make a point of attending that meeting if they know this subject is to come up.

Colonel CRAIGHILL.—If the postponement of this resolution to the January meeting has the effect of bringing members from all over the United States, that is another strong reason for postponing it.

Mr. FTELEY.—Not having the parliamentary acuteness of the President, I am at a loss in most of the motions that have been made. If in order, I ask permission, not to move a resolution, but simply to make a suggestion, as the several gentlemen before me have been making motions decidedly out of order. A member suggested that the names of a certain district had been taken at random. I should say, no. It is evident to me that the first name came out of the first envelope that was opened by the tellers, and it was the first name brought before the Convention.

I should say in regard to Mr. Stanton's resolution that it has a radical defect, inasmuch as it leaves in the hands of the Board of Direction an exceedingly important matter that ought to be left to the whole Society. We had yesterday a sore experience in regard to that. It seems to me that the best way to bring it before the attention of the Society would be not to refer a certain resolution to the Board of Direction.

The PRESIDENT.—The Chair will explain for your information that it is not proposed to refer this resolution to the Board of Direction; it is simply referred to the Society at its next general meeting. I do not want to interrupt, but to be strictly in order, the question is at once upon the postponement which would defer the whole discussion of the matter to next January.

Mr. FTELEY.—I am just talking on that point. It seems to me that the way to bring it to the attention of the Society as a whole is not to bring it before an Annual Meeting. In business matters it is generally understood that when you want to facilitate matters you refer them to a committee. I do not know of a committee better prepared, better qualified, than our Board, and it seems to me the best thing would be to ask our Board to present to the next Annual Meeting its views in regard to the matter. The Board is well acquainted with the views of the Society, and I think we can work a great deal better in that way than if we have no basis at all.

Mr. STANTON.—It seems to me that, as this is simply a request from the Society in Convention assembled to its Board of Direction to ask it to make recommendations to the next Annual Meeting, it is hardly the proper thing to submit it to the Board of Direction and ask them whether it had better be done. It is simply a request that they accommodate us with their good judgment, which I as a Western man believe they have; we ask the honorable Board of Direction for their advice at the next Annual Meeting.

Mr. FTELEY.—It is to become the duty of the Board to give their views in regard to this at the next Annual Meeting, when we have a perfect right to decide.

Mr. HERSCHEL.—Perhaps a suggestion I can make will solve the difficulty. There seems to be force in what Mr. Fteley says, that the action of a meeting of the Society such as this Convention in January would be, would be facilitated by having the subject previously considered by a committee, and I make a motion that the Chair appoint a committee of three, now and here (of which I will beg not to be considered as chairman because I am making the motion), to consider the motion of Mr. Stanton and make a report at the Annual Meeting.

Mr. STANTON.—If in order, I second it.

The PRESIDENT.—It would not be in order; the question is upon the postponement, but the Chair would state before putting that question that, if the postponement be carried, the vote on this matter does not come before the Society until the next January meeting. If amended as suggested it will be well within the province of the Board to be prepared at that time with some recommendation to the Society in regard to it, and such recommendation will be that of your selected representatives from all the districts, and it will probably convey about the same results to the meeting in January as would be obtained by a committee, the selection of which would be difficult for the Chair, as the Chair would feel bound to select men from different localities, who would find it very difficult to meet together.

Colonel CRAIGHILL.—I wish to say one word in reference to the expediency of postponement. Our experience of the other day taught us that very many of us had not performed our duty, when the small number of responses to the request for action upon a very important matter are considered. It seems to me that if this resolution is sent out, we shall hear from it.

Mr. T. H. McCANN.—I am in favor of the postponement. I think the difficulty in nominating arises because each individual comes in with his own ideas, and the difficulty is that all the individuals want to respond and want to make their individual ideas heard; they are widely scattered and there is a great deal of trouble connected with that. The constitution is all right as it is; we want wide latitude. I would be in favor of voting to lay this motion upon the table. Our constitution is a very good one and provides for everything. This last meeting we had went along well enough, and we elected a good committee. I see no use for any other motion.

The PRESIDENT.—The question comes up on the postponement. (Carried.)

The resolution is postponed.

Is there any other business before the Society in business meeting?

Mr. FTELEY.—May I ask whether this meeting understands that,

according to the suggestion made, the Board will make it a business to investigate that question and inform the meeting as to the results.

The PRESIDENT.—The Board has not been so instructed, but I have no doubt the Board will consider it.

A MEMBER.—I don't think the Board has any call to do that.

A MEMBER.—There has been a certain course prescribed for the resolution; not until that has been gone through can any other be taken.

Mr. A. GOTTLIEB.—I want to say a few words which may shed some light. From one district there were twelve names presented for a Nominating Committee. Why was this? I can explain why. I myself did not know until I came here yesterday whom to vote for. When I received the circular from the Secretary I was at a loss whose name I should send in; I knew so many good men I did not know whom to nominate and I am living in a large city. Now, take District No. 7, which is scattered all over the Rocky Mountains—how can they get together and find out what their feelings are? It is impossible; each says I want to send in one name. There was a time about a year ago when the members of the American Society of Civil Engineers in the West organized what we called Local Organizations of the American Society of Civil Engineers, just for the reasons that came up yesterday. When questions came up, all the members of that district got together and they communicated with the President and—

Colonel CRAIGHILL.—We cannot hear what the gentleman says, and I wish to ask whether there is anything before the house.

The PRESIDENT.—Have you any resolution to offer?

Mr. GOTTLIEB.—I have a suggestion to make, and the suggestion which I make now will be in the *Proceedings*, and most of the members in the West may make use of it to their advantage; that is, that if they should band together in their districts and learn each other's views before voting, their vote would have some effect. That is all I have to say.

The PRESIDENT.—If there be no other business to come up, the Society will proceed with the reading and discussion of papers; the papers in regard to iron and steel will be resumed.

The SECRETARY.—Since the discussion of yesterday afternoon, quite a number of members have come in who are interested in the discussion of Steel: one gentleman made the statement that he would like to make some remarks upon the subject.

Mr. BOGART.—Mr. President, before the meeting adjourns, I am requested by the New Jersey Bronze Works, to present in the name of those works to the Society, one bronze work entitled "La Gloire de Fer." This group is cast from the original by Pierre Massent of Paris, and is, so far as I know, the first statue of an engineering character in this country. There accompanies it two bronze candelabra for use on the dining table.

The PRESIDENT.—Gentlemen, you have heard the presentation that has been made to us by Mr. Pearce for the New Jersey Bronze Works; it is a very handsome group. I suppose it will devolve upon the Secretary to make the necessary acknowledgments for the Society.

The business meeting then adjourned, and the Convention proceeded to the discussion of papers already read.

MONDAY MORNING, JUNE 13TH, 1892.—The PRESIDENT.—Gentlemen, the Convention will please come to order. We are called together this morning because there are still a great many papers unread. Owing to the enjoyments and entertainments which have been offered us, there has not been quite as much business transacted as perhaps might be desirable. It is for you gentlemen to say if at this late hour and with this attendance you will go on with the papers.

Colonel CRAIGHILL.—As Chairman of the Committee of Arrangements, I have a few formal resolutions to offer, if it be desirable to have them now.

It will be remembered that two or three days ago our Vice-President, Mr. Brush, offered a resolution as follows:

Resolved, That the Local Committee be requested to prepare resolutions for action by this Convention at its final meeting, acknowledging the various courtesies extended to this Convention, and especially the extraordinary courtesies extended by the officers of the United States Army and Navy in this locality.

That resolution having been adopted by the Convention, there devolved upon the Committee certain duties, the results of which are embodied in the following five resolutions, which I will now read:

Resolved, That the thanks of the American Society of Civil Engineers are most heartily given to Colonel Frank and all the officers of the Post and Artillery School for the kind and cordial reception extended to this Convention as a body and to its members during our sojourn at the Hygeia Hotel; and that Colonel Frank be requested to give notice to his subordinates of this resolution. (Carried.)

Resolved, That the thanks of the American Society of Civil Engineers are hereby heartily given to Commander Weaver of the United States Navy, and to the officers of the Norfolk Navy Yard, for the kind and cordial reception extended to this Convention as a body and to its members at our recent visit to the Yard; and that Commander Weaver be requested to give notice to his subordinates of this resolution. (Carried.)

Resolved, That the thanks of the American Society of Civil Engineers are hereby given to the officers of the Chesapeake and Ohio Railroad for great courtesies to its members before, during and since the session of the Convention at Fort Monroe; and the President of the company is requested to give notice to the proper individuals among his subordinates of this resolution. (Carried.)

Resolved, That the thanks of the American Society of Civil Engineers are hereby given to the officers of the Norfolk and Western Railroad for courtesies to its members during the session of the Convention at Fort Monroe; and the President of the Company is requested to give notice to the proper individuals among his subordinates of this resolution. (Carried.)

Resolved, That the thanks of the American Society of Civil Engineers are hereby given to the officers of the New York, Philadelphia and Norfolk Railroad for courtesies to its members before, during and since the session of the Convention at Fort Monroe; and the President of the Company is requested to give notice to the proper individuals among his subordinates of this resolution. (Carried.)

Resolved, That the President of the American Society of Civil Engineers be requested to forward to the proper officials a copy of each of the five foregoing resolutions, with a suitable letter in each case. (Carried.)

I have still another resolution, and I only regret that the ladies are not here to hear it.

Resolved, That the thanks of the American Society of Civil Engineers are hereby heartily given to the ladies who have been with the Convention at Fort Monroe, and have contributed so much to the pleasures of the occasion. (Carried.)

Colonel CRAIGHILL.—There is one point I want to speak of, with reference to our not having more officers of the Navy with us at our banquet. It appears that, through some unfortunate accident, the invitations were not received at the Navy Yard until noon of the day the persons invited were expected to be present. I think that accident is the cause of the absence of the officers of the Navy and their ladies. I mention the fact in order that this explanation may be placed on record. It is proposed, however, to have a letter written making this explanation, so that there shall be no doubt about the matter being thoroughly understood at the Navy Yard.

Mr. JOHN BOGART.—Mr. President, at the suggestion of a number of members of the Society, I beg to offer a resolution of thanks to the Committee of Arrangements, the Local Committee, and particularly including its Chairman, Colonel Craighill, for the excellent arrangements that have been made and the care taken in all the details of this Convention. (Carried.)

Colonel CRAIGHILL.—Mr. President, I suppose it is proper that I should say a word or two of thanks as a representative of the Committee of Arrangements. I have felt myself in a peculiar position. The President had the kindness to put my name first on the list, making me the Chairman of the Committee. I thought it was a mistake, although the President seldom makes mistakes. I never had attended a Convention before, and I wish to express my regrets that I never have done so, because I have found this one so extremely agreeable that I will never miss another if I can help it. But, as Chairman of the Committee, I must not omit to say, that whatever success has attended the efforts of the Committee of Arrangements is due to others than myself. While all have greatly aided, our thanks are specially due to Major Myers, Mr. Bogart, the Secretary and the Assistant Secretary, for good judgment and much labor in perfecting many vexatious details, and the President himself has not been idle.

As I am one of the older men in the Society, perhaps I may be excused for giving a few parting words of advice before we leave; and I go back to the same subject which I touched upon at the January meeting in New York. I am very fond of going back to old things, although new ones are sometimes good. It is always best to have a text when one moralizes, so I am going to give this one: "Old Virginia never tires." You know I have spoken a good deal on the subject of mint juleps. "Old Virginia never tires" comes in very properly in that connection. Mint grows very freely in Virginia, and every Virginian is taught that it is necessary to consume as much of it as possible; and Old Virginia never tires in reproducing it, because, when an old Virginian is buried, the mint grows up at once out of his grave; and the Old Virginians never, never tire of using it. And now, my advice is, to those who are not Virginians, "Go and do likewise."

The SECRETARY.—I happen to know that there is no copy of the *Transactions* of our Society at the Post, and that the officers would be very glad to get them. I think it would be proper for this Convention to pass a resolution directing me to transmit a copy to the Post.

Mr. J. F. CROWELL.—Would one copy be sufficient? I think there are two separate libraries.

Colonel CRAIGHILL.—I observed that they had the *Proceedings* of the English Institution; but I think I made the suggestion some time ago, to the President, that it would be a very proper thing that they should have in their library a copy of all our past *Transactions*, and that they should be supplied in the future. I do not know the custom in reference to this distribution of our papers. I think one copy would be sufficient, if placed in the Library where it could be seen and read by all the officers of the Post and School.

Mr. CROWELL.—My understanding was, that there was one library in the Fort proper, and one in the Artillery School.

A resolution was then passed directing the Secretary to transmit a complete copy of *Transactions* to the Post.

Mr. CROWELL.—On behalf of certain members, I would like to offer the following resolution. It was intended to offer it when there were more members present; but, as it is a resolution referring to the Board of Direction, perhaps it is proper to offer it now:

Whereas, Certain members of the Society consider that the present badge of the Society is not expressive of the objects of the Society, and believe that the badge of the Society should be significant of its high aim;

Resolved, That the Board of Direction be requested to consider the propriety and advisability of adopting a new badge of the Society, with instructions to report at the Annual Meeting of the Society in 1893, with such designs as they may deem advisable.

Colonel CRAIGHILL.—I second the motion, and I have to say that while I have been a member of the Society for a good many years,

and have desired to conform to the customs of the Society, yet I have abstained from wearing the badge as it did not seem properly significant of the high functions of the greatest number of the members of the American Society of Civil Engineers.

The PRESIDENT.—Are there any remarks to be made to this question?

Mr. COOPER.—Do I understand that it is a mandatory resolution?

Mr. BOGART.—It seems to me to be mandatory upon the Board to present other designs.

Mr. COOPER.—This matter has been discussed very thoroughly before, and it has been found very difficult to get any symbol characteristic of engineering; in fact, to my mind, the lead pencil comes nearer it than anything else, and that of course would not answer. Besides, we are reduced to a very small number here, and on an important matter like this I think action should be postponed until there is a larger number of members present.

Colonel CRAIGHILL.—I think the resolution had better be read again.

The Secretary read the resolution.

Mr. COOPER.—That puts it satisfactorily.

Mr. CROES.—I think it is hardly a proper time or place to offer such a resolution. We have here now at this stage of the meeting fewer members present than at first, or from any other district than we have at any regular business meeting in New York City. I think it would be more proper and would not cause any material delay if the matter was brought up later and if the resolutions were a little more carefully worded than they are. I do not think sufficient cause is given in the resolution for the action to be taken. The preamble states that, *Whereas*, A number of members don't like the badge, *Resolved*, That the Board of Directors take into consideration the alteration of it entirely. You may offer such a resolution in regard to almost anything connected with the Society. The wording of the resolution is what I object to; the putting it in the minutes and sending it out to the Society in that form, and the time and place. I think it would be better if offered at a business meeting of the Society at its place of meeting.

The PRESIDENT.—Do you propose its postponement?

Mr. CROES.—Yes, sir. I ask the gentleman to withdraw the resolution.

Mr. CROWELL.—I would rather not withdraw the resolution. While I am one of the number who disapprove of the badge, yet I am one who heartily approves of a better badge. I have heard a great many criticisms passed upon it, both on the part of our members, and of other people. My object in offering the resolution is to put the consideration of the subject into the hands of those who are perfectly

competent to consider it. If we had a larger attendance here it might be still more proper to offer the resolution; still I consider it advisable that it should be offered. The Board will have plenty of time to consider the matter, and their report will bring the matter into such a shape that the Society can consider the proposed change. I think it leaves the Board perfectly free. If a subject is worth considering at all, it is the more important that it should have the careful consideration of such a body as the Board of Direction, before it receives that of the Society at large.

Mr. BOGART.—It seems to me the objection of Mr. Croes to the wording of the resolution is very well taken. I should not perhaps object that the Board of Direction be requested to consider the expediency of changing the badge of the Society and to make a report, but to commit this meeting to the “whereas” of the resolution I think is not right.

Colonel CRAIGHILL.—I move that the “whereas” be stricken out.

Mr. CROWELL.—I accept that.

Colonel CRAIGHILL.—At the January meeting, and at any Convention, there is very little time for careful detailed consideration of subjects. There is nothing mandatory upon the Board of Direction in this resolution; it is requested to consider the work of improving the badge of the Society. I think there is nothing that ought not to be improved if it can be. We cannot find this out unless we critically examine it from time to time. I am in favor of the matter of a change in the symbol being taken into consideration; whether it leads to change or not remains to be seen; if there is to be improvement, let us have it, and let us have the postponement until January, to give time for careful consideration. The Board will be ready by January to give us a matured opinion upon the subject.

Mr. CLEMENS HERSCHEL.—It may seem a very useless matter for a member of the Society to address so small a proportion of his fellow members as happen to be present here this morning; but, Mr. President, we have here a stenographer, and whatever takes place here is reported *verbatim* and printed and spread before the Society. A member, therefore, who gets up here and makes a remark, is really addressing the whole Society, if not directly, yet in a very effective manner. It is for that reason that I do not hesitate to say a few words upon this subject.

This matter of the badge is one of some years' standing, and it is well to recall the fact that when the badge was adopted, from the day of its adoption it met with much opposition. One of our members took pains to send out circulars at his own expense, and address the Society with a view of having the badge changed, and changed in the line of what is asked here to-day. I thought the points taken at the time were well taken. A badge of this sort should not have upon it a

thing so decidedly of the earth earthy as the level. Take the badge of the mining engineers, which are two symbols which have long gone out of use, yet they are entirely appropriate because merely conventional. The symbol that was put upon our badge was put there, as I understand it, simply because nothing else was for the moment thought of. I hope the resolution offered here will prevail, and I look upon it that we are simply laying this matter before the whole Society. It is never too early to begin a work of this kind, and this matter never will be settled until it is settled right.

The PRESIDENT.—I believe that the mover of the resolution accepted some suggestion.

Mr. CROWELL.—I propose to modify the resolution by erasing the preamble, and the resolution reads now: *Resolved*, That the Board of Direction be requested to consider the propriety and advisability of adopting a new badge of the Society, and with instructions to report at the Annual Meeting of the Society in 1893, with such designs as they may deem advisable.

Mr. CROES.—If he were to strike out the last part. If he would just make it a simple business-like proposition instead of putting a sting in the tail, "with instructions to report."

Mr. CROWELL.—I am willing to withdraw that; the object was to save six months of time.

Mr. CROES.—The thing has been going on for twenty-five years.

Mr. CROWELL.—The badge has not, but I am perfectly willing to withdraw it and leave it at that point.

Mr. BOGART.—I am perfectly willing that it should pass in that last modified form. I happen to be a member of the Board. It is very pretty for this small meeting of members to say to the members of the Board, "You must come up in six months from now with designs for a new badge." I happened to be a member of the Board when the badge was adopted. I don't say I at all liked the design, but all the others were worse. The gentleman from California to whom our friend has alluded—Mr. Wm. Hammond Hall—in answer to a letter from me, asking him, "Will you not send us what you think ought to be the badge?" sent word, "I cannot tell, and I don't know; only I don't like anything you suggested."

Col. CRAIGHILL.—I hope we are not treading upon any one's toes. I repeat that there are few things that cannot be improved, and I think the American Society of Civil Engineers ought to have the very best badge. In twenty-five years we ought to have learned something in the direction of improvement.

Mr. BOGART.—No, you are not treading on anybody's toes. The man who really made the design for that badge, is not with us any longer; he died some years ago.

The PRESIDENT.—Gentlemen, you have heard the resolution. All in favor, etc. (Carried.)

What other business have you, Mr. Secretary?

The SECRETARY.—None.

MR. COOPER.—Mr. President, I move that this Convention adjourn.
(Seconded. Carried.)

OF THE BOARD OF DIRECTION.

MAY 31ST, 1892.—The subjects of Engineering Headquarters and of the entertainment of such Foreign Engineers as may visit the Columbian Exposition in 1893, were discussed; and a circular concerning these matters was adopted and ordered sent to all members of the Society.

The details of arrangement for the Convention were discussed, and the usual courtesies were ordered to be extended.

The question of dues from certain members in arrears, was considered.

Applications for membership were considered.

The following were declared elected:

As Associate: George Hervey Ely, Cleveland, O. As Juniors: George Thomas Barnsley, Dingess, W. Va.; Shirley Carter, Baltimore, Md.; James Harvey Edwards, East Berlin, Conn.; Charles Henry Jewett, Keyport, N. J.; Julius Alfred Ludwig, New York; Robert Engler Neumeyer, Bethlehem, Pa.; William Henry Fenn, New Britain; Conn.; Gabriel Cooley Tuthill, Detroit, Mich.; Aaron Howell Van Cleve, Niagara Falls, N. Y.; Frederick Kelly Wing, Buffalo, N. Y.

JUNE 10TH, 1892.—In accordance with Article VIII, Section 7, of the Constitution, a meeting of the Board was held at the Hygeia Hotel, Fort Monroe.

A Committee was ordered on the subject of papers to be presented at the next Convention of the Society (which is to form a part of the Engineering Congress to be held at Chicago in 1893), with directions to report its action to the Board of Direction at an early date.

The circular sent out in May by the Publication Committee to the editors of the technical journals, was ordered not to be enforced in connection with the proceedings of the present Convention.

There was also a discussion of the matter of funds for the expenses of the Engineering Congress.

At the meeting of the Board, May 3, 1892, a letter was presented from Past President Whittemore, suggesting that suitable action be taken in regard to the death of Sir John Coode, Past President of the Institution of Civil Engineers; that such action be engrossed in duplicate, one for the family of Sir John Coode, the other for the Institution.

A Committee to prepare a suitable memorial was appointed by the President, consisting of Past Presidents Whittemore and Chanute and Director Thomson.

The following memorial, prepared by the Committee, was approved by the Board at its meeting of May 31st:

MEMORIAL.

It is with profound regret that the members of the American Society of Civil Engineers have learned of the death of Sir John Coode, K. C. M. G., Past President of the Institution of Civil Engineers of Great Britain.

The American Engineers who composed the party that visited Europe in 1889, have given their fellow members such glowing accounts of the reception accorded them in Great Britain, by Sir John Coode, then President of the Institution of Civil Engineers; of the thoughtful, earnest and charming hospitality with which they were entertained by him, and of the cordial way in which he made them welcome, that all American engineers have had common cause to honor and to esteem him.

Now that his life is ended, his work done, this memorial is sent as an expression of the regard entertained by all American engineers for the man who, perhaps more than any other, caused the members of the British and of the American Engineering Societies to unite in closer kinship, and thus hastened the time when there shall alone reign but "peace and good will among the nations."

THE AMERICAN SOCIETY OF CIVIL ENGINEERS,

By the Board of Direction.

New York, May 31, 1892.

(Signed) MENDES COHEN, *President*.

[SEAL.]

(Signed) F. COLLINGWOOD, *Secretary*.

Two copies of the Memorial were engrossed (one bound as a portfolio for the family of Sir John Coode, the other framed for the Institution), and forwarded by express July 16.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
MARTIN, ROBERT KIRKWOOD.....	Chief Engineer Water Department, Baltimore, Md....	June 1, 1892
POYNOR, DAVID ASHLEY.....	City Engineer, Dallas, Texas.	June 1, 1892
RAYMOND, CHARLES WALKER	Major Corps of Engineers U. S. A., 1428 Arch st., Philadelphia, Pa.....	June 1, 1892
SEE, HORACE.....	1 Broadway, New York City...	June 1, 1892
WELLS, CHARLES EDWIN.....	Warsaw, Ohio.....	June 1, 1892

ASSOCIATE MEMBERS.

BAIER, JULIUS.....	52 Laclede Bldg., St. Louis, Mo.)	Jun.....	Sept. 7, 1887
CONVERSE, WILLIAM HASSON.....	Chattanooga, Tenn)	Assoc. M.	June 1, 1892
		Jan.	6, 1892

		Date of Election.
ELDRIDGE, GRIFFITH MORGAN....	City Engineer, Americus, Ga..	June 1, 1892
KIRKPATRICK, WALTER GILL....	4 Berry Block, Nashville, Tenn.	Apr. 6, 1892
POTTER, ALEXANDER.....	Olean, N. Y. { Jun..... Jan. 4, 1888	
	Assoc. M..... Jan. 6, 1892	
REYNDERS, JOHN VAN WICHERN.	Engineer in Charge Bridge and Construction Dept., Penna. Steel Co., Harrisburgh, Pa..	June 1, 1892
ROSS, ELMER WAYLAND.....	City Engineer's office, Providence, R. I. { Jun..... Mar. 5, 1890	
	Assoc. M. June 1, 1892	
TRIBUS, LOUIS LINCOLN.....	84 Warren st., New York City. { Jun..... Apr. 4, 1888	
	Assoc. M. June 1, 1892	

JUNIORS.

BARNESLEY, GEORGE THOMAS.....	Dingess, Logan Co., W. Va. ...	May 31, 1892
TITHILL, GABRIEL COOLEY.....	Bridge Engineer's office, M. C. R. R., Detroit, Mich..	May 31, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

BERG, LOUIS DE COPPET.....	Jackson Bldg., Union Square, New York City.
BLACKWELL, CHARLES	Mount Lookout, Cincinnati, Ohio.
BOOTH, WILLIAM H.....	41 Dartmouth Park Road, Highgate Road, London, N. W., England.
CALKINS, FRANK A.....	387 North State st., Chicago, Ill.
CHILDS, JAMES E.....	General Manager N. Y., O. & W. R. R., 56 Beaver st., New York City.
CROSBY, B. L.....	Resident Engineer Bellefontaine Bridge, 1409 North Park Place, St. Louis, Mo.
EAYRS, N. W.....	Supt. of Structure, Terminal R. R. Association, St. Louis, Mo.
ECKERT, E. W.....	1313 Monadnock Bldg., Chicago, Ill.
FULTON, JOHN A.....	219 Dearborn ave., Chicago, Ill.
GARDNER, G. CLINTON.....	General Manager Ohio River R. R., Parkersburg, W. Va.
GREENOUGH, M. S.....	356 Superior st., Cleveland, Ohio.
KILLEBREW, SAMUEL.....	Brownsville, Tenn.
KINSLEY, THOMAS P.....	1425 Maryland ave., Baltimore, Md.
LINVILLE, JACOB H.....	1421 Pacific ave., Atlantic City, N. J.
MORRIS, MARSHALL.....	16 Morton Bldg., Louisville, Ky.
OSTROM, JOHN N.....	East Randolph, N. Y.
RICE, GEORGE S.....	Chief Engineer Rapid Transit Commission, Ware st., Newton Center, Mass.
RIFFLE, A. S.....	Oregon Bridge Co., Goodnough Bldg., Portland, Ore.
RIFFLE, FRANKLIN	Oregon Bridge Co., Goodnough Bldg., Portland, Ore.
SCHAUB, JULIUS W.....	65 Ledyard st., Detroit, Mich.
SHANLY, J. M.....	346 Prince Arthur st., Montreal, Canada.

STEWART, JOHN M.....	Assistant Engineer Dept. of Docks, foot of Chambers st., N. R., New York City.
VOORHEES, PAUL.....	65 Chapin Block, Buffalo, N. Y.
WENTWORTH, WM. H.....	President and General Manager Refugio and Conception Mining Co's of Tamaulipas, Monterey, Mexico.

ASSOCIATE MEMBERS.

ERLANDSEN, OSCAR.....	328 East 86th st., New York City.
HOUSTON, JOHN J. L.....	Assistant Engineer N. Y., N. H. & H. R. R., Bridgeport, Conn.

ASSOCIATES.

RICHARDS, JOSEPH R.....	55 Kilby st., Boston, Mass.
WARDER, JOHN H.....	428 N. State st., Chicago, Ill.

JUNIORS.

BELL, G. J.....	1414 Froost ave., Kansas City, Mo.
BOGGS, EDWARD M.....	Redlands, Cal.
BYERS, MORTON L.....	191 Delaware ave., Indianapolis, Ind.
CLARK, WILLIAM G.....	(Care Wickenden & Clark), Gardner Block, Toledo, Ohio.
COMSTOCK, CHARLES W.....	2107 Michigan ave., Chicago, Ill.
CREUZBAUR, R. WALTER.....	(Care N. Y. C. & H. R. R.), 132 Park ave., Room 7, New York City.
LENTILHON, EUGENE.....	Dept. of Docks, foot of Franklin st., N. R., New York City.
LOWINSON, OSCAR.....	S. W. Cor. 114th st., and Pleasant ave., New York City.
MILLARD, CURTIS	Chief Engineer C. S. & N. R. R., Sumpter, S. C.
PARISH, WAINWRIGHT.....	1 West 30th st., New York City.
PARSONS, S. A.....	Assistant Engineer Everett Land Co., Everett, Wash.
SHERMAN, C. W.....	41 Ross Bldg., Binghamton, N. Y.
ST. JOHN, R. C.....	(Care Rudolph Hering), 277 Pearl st., New York City.

DEATHS.

DILLON, SIDNEY	Elected Fellow, March 26, 1870; died June 9, 1892.
WHITELAW, JOHN.....	Elected Member, February 5, 1873; died June 16, 1892.

ADDITIONS TO

LIBRARY AND MUSEUM.

From Canadian Institute, Toronto, Canada: An Appeal to the Canadian Institute on the Rectification of Parliament. Annual Archaeological Report and Canadian Institute (Session, 1891). Transactions No. 4, April, 1892.	From Cornell University, Ithaca, N. Y.: Exercises at the Opening of the Library Building, October, 1891. From Granville C. Cunningham, City Engineer, Toronto, Can.: Report of the City Engineer, Toronto, 1891.
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- From F. Lynwood Garrison, Phila.:
New Alloys and Their Engineering Applications.
- From Geographical Survey of Pennsylvania:
Final Report, Vol. 1.
Southern Anthracite Field Atlas.
- From E. W. Howe, Assistant Engineer, Boston:
Seventeenth Annual Report of the Board of Commissioners (Department of Parks) for thirteen months ending January 31, 1892.
- From Institution of Civil Engineers:
Abstract of Papers in Foreign Transactions.
Meters for Electrical Energy.
Rosario Water Works, Argentine Republic.
Average Annual Rainfall.
Transverse Steel Sleepers.
List of Members, June 3, 1892.
- From Louisiana Board of State Engineers:
Report of the Board of State Engineers of the State of Louisiana from April 20, 1890, to April 20, 1892.
- From C. C. Martin, Chief Engineer, Brooklyn, N. Y.:
Opening Ceremonies of the New York and Brooklyn Bridge.
Reports of the Executive Committee and Treasurer of the N. Y. Bridge Co., 1872.
Reports of the Treasurer of the New York and Brooklyn Bridge, from 1874 to 1885.
Reports of the Trustees of the New York and Brooklyn Bridge for the years ending December 1, 1887 and 1889.
Report of the Officers of the N. Y. Bridge Co., February, 1875.
Report of the General Superintendent (1873) and the Chief Engineer (1874) of the New York Bridge Co.
By-Laws of the New York Bridge Co.
Communication to the Board of Aldermen of N. Y., by the President of the Trustees of the New York and Brooklyn Bridge, February 3, 1876.
Report of the Chief Engineer of the New York and Brooklyn Bridge on Enlarging the Traffic Facilities of the Brooklyn Bridge.
Report of G. Leverich, C. E., on same.
Report of the Board of Experts on same.
Report of plans for same.
Report of the Committee appointed by the Board of Trustees to examine the financial affairs of the New York and Brooklyn Bridge.
Plans for Increased Passenger Service on the New York and Brooklyn Bridge Cable Railway.
U. S. C. C.—Abraham B. Miller vs. The Mayor of N. Y.
Testimony taken by the Committee of Commerce and Navigation in relation to the New York and Brooklyn Bridge. Specifications for the New York and Brooklyn Bridge as follows:
For American Hydraulic Cement, 1878.
For Galvanized Iron Wire for Cable Wrapping, 1878.
For Granite Paving Blocks, June, 1880.
For Steel Suspenders, Connecting Rods, Stirrups and Pins, 1880.
For Wrought-Iron Superstructure of Street Bridges, Brooklyn Approach, June, 1880.
For Southern Yellow Pine and White Oak Lumber.
- For Construction of a Bridge on the line of the East River Bridge across Franklin Square, June and July, 1880.
For White Pine and Spruce Lumber, 1882.
For Design and Construction of Passenger Cars, 1882.
For Wrought-Iron Work for Extension of Brooklyn Viaduct, 1883.
For Laying Flag and Curbstones, July, 1883.
For Girders and Beams for Warehouses, 1885.
For Foot Bridge and Stairways at Brooklyn Station, 1885.
For Completing the Warehouse, N. Y. Approach, 1886.
For Extension of the Railway Platform at Brooklyn Station.
For Extension of the Roadways at N. Y. Station.
For Steam Engine for Cable Driving Plant.
For Traction Clutches for Cable Driving Plant.
For Extension of Cable Driving Plant.
For Wrought-Iron and Steel Columns, Girders, Beams and Connections.
- From Geo. Morison, C. E., Chicago, Ill.:
Two Lithographs of the Bellefontaine Bridge, St. L. K. and N. W. R. R.
- From Minister of Public Works, Rome, Italy:
Catalogo della Esposizione Collettiva del Ministero dei Lavori Pubblici alla Esposizione Nazionale di Palermo del 1891-92.
- From Geo. K. McCormick, Jr., Malone, N. Y.:
Annual Report of the City Engineer of the City of Omaha, for the year 1886.
- From N. Y. Meteorological Observatory:
Annual Tables for the year 1891.
- From Nova Scotian Institute of Science:
Proceedings and Transactions, session 1890-1891.
- From Smithsonian Institution:
Annual Report of the Board of Regents to July, 1890.
- From U. S. Board of Education:
History of Higher Education in Ohio, in Michigan and in Massachusetts.
Fourth International Prison Congress, St. Petersburg.
Southern Women in the Recent Educational Movement in the South.
Promotions and Examinations in Graded Schools.
Rise and Growth of the Normal School Idea in the U. S.
Biological Teaching in the Colleges of the U. S.
- From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, June, 1892.
The Use of Oil to prevent Heavy Seas Breaking on Board Vessels.
Report of the Superintendent of the U. S. Naval Observatory for the year ending June 30, 1891.
- From Verein Deutscher Portland Cement Fabrikanten:
Protokoll der Verhandlung, 26 und 27 Feb., 1892.
- From George E. Waring, Jr., C. E., Newport, R. I.:
Sewage Disposal for Isolated Homes and Large Institutions.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—July, 1892.

No meetings of the Society nor of the Board of Direction were held during July.

MEMOIRS OF DECEASED MEMBERS.

SAMUEL B. REED, M. Am. Soc. C. E.*

DIED DECEMBER 25TH, 1891.

Samuel Benedict Reed was born at Arlington, Vt., November 18th, 1818. The family soon removed to Ottawa, Canada, and later to western New York, where he attended the public schools and Middleport Academy.

Mr. Reed began his engineering work, in 1841, as a rodman on the Erie Canal enlargement between Albion and Rochester. He left that work in the spring of 1842 to enter the employ of the Detroit and Pontiac Railroad, now part of the Michigan Central, where he remained until its completion in 1843. He was engaged the next year on the Michigan Central.

In 1844 Mr. Reed went to Joliet, Ills., and located on the farm which he owned until his death. Early in 1846 he visited the Lake Superior copper region, investigating its mineral resources, thence to the head-waters of the Mississippi, and down that river towards home. He resumed his engineering work on the Michigan Central in 1846, and, until 1850, was actively engaged on that road and the Michigan Southern. During the next three years he was engineer of the Rock

* Memoir prepared by H. Bissell, M. Am. Soc. C. E.

Island Road from Chicago to the Mississippi River and of the bridge over that river at Rock Island. He was engaged on extensions of the Rock Island Road in Iowa from 1855 to 1859, and on the Burlington and Missouri River Road in the years 1861 and 1862.

Early in 1864 he was appointed Division Engineer on the Union Pacific Railroad, and was in charge of surveys on the Pacific slope during 1864 and 1865. He ran many lines, and carefully examined the country from Bridger Pass and South Pass west across Green River, the Salt Lake Basin and the Great Desert to the Valley of the Humboldt. This was done in the face of dangers and obstacles of every kind which most men would have deemed insurmountable. In the winter of 1865 and 1866 he was appointed Superintendent of Construction, which post he held until after the completion of the road in 1869. From 1871 to 1875 he was Chief Engineer and Superintendent of Construction on the Mississippi Central from Cairo to New Orleans.

In 1879 Mr. Reed was appointed Receiver of the Chicago, Pekin and Southwestern Railroad, which position he held until early in 1882 when he was appointed Chief Engineer of the Canadian Pacific Railroad. The Company had been in existence less than a year, and he at once began to organize a Construction Department and arrange for the vast work to be done. His health failing, he was in a few months obliged to resign, but not until the organization he had done so much to perfect, had been set in motion. The Company, however, still sought his advice, and in 1884 he was induced to go to British Columbia to solve some difficult questions in the location of the line along Kamloops Lake, where for a great distance the cliffs rising vertically from the deep waters of the lake presented a most formidable obstacle to the engineers. This mission satisfactorily accomplished he crossed the Selkirk and Rocky Mountains, most of the way on foot, to examine and report upon this least known section of the railway, and he was among the first to cross these mountains from one side to the other. This closed his engineering career. Since then until his death most of his time was spent at his home in Joliet. In July last he went to Pasadena, California, where he died.

In 1855 he married Miss Jane Earle at Geneseo, Ills., who with three daughters survives him.

Mr. Reed was well versed in geology and natural history, and was an extensive traveler, having visited every State and Territory of the Union, except Alaska, besides Canada, Central America, and the West Indies. As a locating engineer he probably had no equal. His skill, accuracy and good judgment in all engineering matters were unexcelled.

Very few men have their abilities so severely taxed as were Mr. Reed's during the construction of the Union Pacific Railroad. The

country was mainly an uninhabited waste; with rare exceptions there was no timber and no rock of any use. The Indians were troublesome, supplies in many cases were hauled hundreds of miles, men that should have helped sometimes hindered. In the face of all these obstacles more than 500 miles of the most difficult part of the road were begun and completed within a single year. He was the official and actual leader of the work.

He had a leading part in building the first railroad into Chicago from the East, the first railroad from Chicago to the Mississippi River, built the first important bridge over the Mississippi, and the first railroad across the Rocky Mountains.

Never striving for popularity Mr. Reed gained and held the respect and confidence of those with whom he was associated. He was a man of the strictest integrity in all the relations of life; an earnest Churchman, and for many years Senior Warden of Christ's Church, Joliet.

Mr. Reed was elected a member of the American Society of Civil Engineers October 20th, 1869.

LIST OF MEMBERS.

ADDITIONS.

MEMBER.

	Date of Election.
YEATMAN, MORGAN EDWARD.....Roanoke, Va.....	May 4, 1892

ASSOCIATE MEMBERS.

ENGSTRÖM, FRANS.....	Assistant Engineer Pennsylv-	
	ania Co., Pittsburgh, Pa...	May 4, 1892
WHEELER, HARRY ROBERTS.....	(Care Babcock, } Lang & Co.), } Newburgh, N.Y. }	Jun..... Apr. 4, 1888 Assoc. M. May 4, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

BEAHAN, WILLARD.....	58 Liberty St., Owego, N. Y.
BREEN, HOWARD.....	600 California Bldg., Denver, Colo.
BUTTERFIELD, FRANCIS E.....	175 Adams St., Chicago, Ill.
FAVA, FRANCIS R., JR.....	Loan and Trust Co. Bldg., Room 99, Washing-
	ton, D. C.
FEIND, BERNHARD.....	1105 The Rookery, Chicago, Ill.
GILES, ROBERT.....	North Topeka, Kas.

HUDSON, JOHN R.....	19 Twenty-sixth St., Chicago, Ill.
JAMIESON, J. Q.....	Quincy, Plumas Co., Cal.
MEIER, EDWARD D.....	Heine Safety Boiler Co., 421 Olive St., St. Louis, Mo.
REA, SAMUEL.....	Assistant to President Pennsylvania R. R., Philadelphia, Pa.
STUART, A. A.....	(Care Brooklyn Elevated R. R.), 31 Sands St., Brooklyn, N. Y.
THOMPSON, W. G. M.....	St. Catherine, Ontario, Canada.
TOMPSON, GEORGE M.....	Principal Assistant Engineer New York, New Haven & Hartford R. R., P. O. Box 14, Bridgeport, Conn.
WHITE, W. HOWARD.....	Redlands, Cal.

ASSOCIATE MEMBERS.

HILL, JOHN E.....	145 Fourth Ave., Chicago, Ill.
HOUSTON, J. J. L.....	Box 14, Bridgeport, Conn.
SISSON, WM. LEE.....	Harper's Ferry, W. Va.

ASSOCIATES.

GOODELL, JOHN M.....	120 Madison Ave., New York City.
KARNER, WILLIAM J.....	37 Bellevue Place, Chicago, Ill.
DEANS, CHARLES H.....	Assistant Engineer, SooySmith & Co., 2 Nassau St., New York City.
FOWLER, C. E.....	288 N. Hight St., Chillicothe, Ohio.
JEWETT, W. B.....	17 Summer St., Northampton, Mass.
TEMPLE, J. FRED.....	48 Santa Fé Bldg., Topeka, Kans.
WHEATLEY, ARTHUR C.....	(Care Bainbridge & Comer) San Antonio, Texas.

ADDITIONS TO LIBRARY AND MUSEUM.

From American Institute of Mining Engineers:

Copper Crystallization at the Copper Glance and Potosi Mines, Grant County, New Mexico.

High-Pressure Hydraulic Presses in Iron Works.

List of Officers, Members, Rules, etc.

Note on the Use of a Mechanical Stirrer for promoting Chemical Action.

Plain vs. Corrugated Belts for Vanners. Proceedings of the Sixty-second Meeting, June, 1892.

The Chase Magnetic Ore Separator.

The Gold Fields of Otago.

The Granulation of Iron Ore by means of Crushers and Rolls.

The Marsac Refinery, Park City, Utah.

The System of Filling at the Mines of the Minnesota Iron Company, Soudan, Minn.

Titaniferous Iron Ores in the Blast Furnace.

From Cornell University, Ithaca, N. Y.:

Annual Report of the President for 1889-90 and 1891-92.

Creaming and Aerating Milk.

Removing Tassels from Corn.

From Director-General of Railways, Simla, India:

Administration Report on the Railways in India for 1891-92, Part I.

From Daniel Draper, Ph.D.:

New York Meteorological Observations, 1892.

- From F. Lynwood Garrison, C. E., Philadelphia:
The Development of American Armor Plate.
- From Rudolph Hering, C. E., New York:
Report upon the Sewerage of the District of Columbia.
- From Institution of Civil Engineers, London, Eng.:
Certain Climatic Phenomena.
Electrical Measuring Instruments.
Fly Wheels and Governors.
Gold Quartz Reduction.
Lighthouses.
List of Members, June 3d, 1892.
Petroleum Engines.
Sewage Farms of Berlin.
Stresses and Deflections in Braced Girders.
The Use of Liners in Ordnance.
Transandine Railway Bridges.
Victoria Bridge, Stockton on Tees.
Waste of Water.
- From M. R. Jefferts, C. E., London, Eng.:
Chart showing Railway Mileage since 1881.
- From George E. Mann, C. E., Buffalo, N. Y.:
The Proposed Grade Crossings Changes.
- From Geo. E. Morison, C. E., Chicago, Ill.:
The Cairo Bridge. Report of the President to the Directors of the Chicago, St. Louis and New Orleans Railroad, February 24, 1892.
- From North of England Institute of Mining and Mechanical Engineers, Newcastle, Eng.:
Transactions, Vol. XLI, Part III.
- From Albert A. Pope, Boston, Mass.:
A Memorial to Congress on the Subject of a Comprehensive Exhibit of Roads at the World's Columbian Exposition.
- From Collingwood Schreiber, Ottawa, Can.:
Railway Statistics of Canada for 1891.
- From Hamilton Smith, Jr., London, Eng.:
Alaska Treadwell Gold Mining Company.
Balance Sheet and Profit and Loss Account.
- Directors' Report, El Callao Gold Mining Co., 1891.
- From Society of Engineers, London, Eng.:
Transactions, 1891.
- From the Official Railway List, Chicago:
Official Railway List for 1892.
- From U. S. Department of State:
Reports of Consuls, May, 1892.
Special Consular Reports. The Slave Trade in Foreign Countries.
- From U. S. Department of Agriculture:
Report of the Chief of the Division of Forestry for 1891.
- From U. S. National Museum:
Bulletin No. 41. The Published Writings of Dr. Chas. Girard.
Annual Report for the year ending June 30, 1889.
The Museums of the Future.
- From U. S. Geological Survey:
15 Maps of the U. S. Geological Survey.
- From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, July, 1892.
The American Ephemeris and Nautical Almanac, 1895.
- From U. S. Treasury Department:
Quarterly Report of the Chief of the Bureau of Statistics relative to the Imports, Exports, etc., for March, 1892.
Reports as follows:
Relative to the Plans for Bridges over the Willamette River.
Relative to the Destruction of Government Dams on the Mississippi River.
Relative to the Bill to Authorize the Missouri River Power Company of Montana to construct a Dam across the Missouri River.
- From John Wiley & Sons, New York:
Johnson's Tables.
- From World's Columbian Exposition, Chicago:
World's Fair Notes.

BOOK NOTICES.

JOHNSON'S TABLES. STADIA AND EARTHWORK TABLES.

Reprinted from "Theory and Practice of Surveying." By J. B. Johnson. Washington University, St. Louis, 6 x 9 $\frac{1}{4}$ inches, cloth, pp. 99. New York, John Wiley & Sons, 1892.

The logarithmic and other tables here given were originally printed in Prof. Johnson's work "Theory and Practice of Surveying," but are issued in the present form as being more convenient for practical use. They embrace also trigonometric formulas, stadia reductions, natural sines and cosines, values of coefficients in Kutter's formula, earthwork tables, etc. Thirty-four pages are given to the measurement of volumes.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XIX.—August, 1892.

No meetings of the Society nor of the Board of Direction were held during August.

MEMOIRS OF DECEASED MEMBERS.

J. E. HILGARD, M. Am. Soc. C. E.*

DIED MAY 8TH, 1891.

Julius Erasmus Hilgard was born at Zweibrücken, in the Palatinate, in 1825. His father, a judge of the Court of Appeals of Bavaria, was so strongly imbued with republican ideas that he determined to sacrifice to them his promising career and emigrate to this country. He brought with him his son Julius, then a lad of ten, and established himself on a farm near Belleville, Ill. There he instructed Julius in the classic and modern languages and in elementary mathematics, for which latter study the pupil showed an aptitude bordering on genius, so that his rapid advance in this science soon made him dependent on self-study.

Leaving home, Mr. Hilgard went to Philadelphia, to study engineering, and for a brief time he was engaged on railway surveys. In 1845 he received an appointment to the coast survey, then under the direction of Alexander Dallas Bache. His marked ability procured him immediate recognition, and, notwithstanding his youth, he was placed at the head of a surveying party in 1846, and made trigonometric, astronomic and magnetic observations. His efficiency was as marked in the office as in the field, and the various duties assigned to him were always discharged with more than ordinary ability.

In 1862, at the outbreak of the civil war, Mr. Hilgard was placed in charge of the office, and performed the onerous duties created by

* Memoir prepared by O. H. Tittman, Esq.

the demands of the Army and Navy for assistance from the coast survey, with vigor and great administrative ability. When Prof. Bache became incapacitated in 1864, the whole direction of the survey in all its details devolved upon Mr. Hilgard for a period of three years, in addition to the duties of his own office. After the appointment of a successor to Prof. Bache, Mr. Hilgard continued as assistant in charge of the office, giving much of his time to the Office of Weights and Measures which was practically under his direction.

He took a very active part in shaping the legislation relating to the introduction into this country of the metric system, and prepared the standards of that denomination, which were distributed to the various States of the Union.

In 1872 Mr. Hilgard made telegraphic longitude determinations between Europe and America, including Paris and Greenwich in his operations, and thus obtained the first reliable telegraphic difference of longitude between those great observatories.

Mr. Hilgard represented the United States officially as scientific delegate to the International Convention at Paris, convoked for the purpose of forming an International Bureau of Weights and Measures. As vice-president, he took an active part in the councils of the commission, and after the plans had been formulated and agreed to, he was offered the directorship of the bureau, an offer marking the esteem in which his abilities were held by the eminent men composing the commission, but he declined it.

At the Centennial Exposition, held in Philadelphia in 1876, Mr. Hilgard acted as one of the judges on scientific and mechanical apparatus, being associated in that duty with some of the ablest scientists of Europe and America. At about the same time he delivered a course of lectures at the Johns Hopkins University on extended territorial surveying.

At the close of 1880 Mr. Hilgard was made superintendent of the coast survey, in which capacity he served until 1885, when he resigned. Utterly broken in health he lingered on, having been many times at the point of death, until May 8th, 1891, when he died.

Mr. Hilgard was a kind and genial man, of great versatility and learning, of wide influence, and had an extended and intimate acquaintance with scientific men at home and abroad. While carrying the great and ever-varying burden of his official duties, he found time to extend his sympathy, help and wise counsel, which was much sought, to many persons in many ways, outside as well as inside of his official sphere.

Mr. Hilgard was a charter member of the National Academy of Sciences, and a member of many other scientific bodies.

He was elected a Member of the American Society of Civil Engineers on July 10th, 1872.

JOHN WHITELAW, M. Am. Soc. C. E.*

DIED JUNE 16TH, 1892.

John Whitelaw was born in Cleveland, O., July 31st, 1831. He was educated in the public schools of Cleveland and Canada. Later, he studied civil engineering under John Shier, a noted Canadian engineer and surveyor. In the year 1857 he became connected with the City Civil Engineer's Department of Cleveland, as Assistant. Two years later he was appointed City Civil Engineer, and was re-appointed in 1860, but resigned shortly after to engage in contract work, with James Howells, of Buffalo.

His engineering ability was early recognized, as he was again called to take the position of City Civil Engineer in 1861. The year following he resigned his position, but remained in the city's employ until the following November, when he went to Canada, the early home of his wife, and remained until 1864, when he returned to his native city. He again received the appointment of City Civil Engineer, which office he retained for three years, relinquishing it to accept the position of Superintendent and Engineer of Water Works in May, 1867, which important office he held continuously for twenty-five years, until the time of his death.

When assuming control, there were 37 miles of pipe, and less than 2 000 connections; one pair of Cornish pumps of a daily capacity of 8 000 000 gallons, and a reservoir holding 6 000 000 gallons.

The first important step taken after accepting this position was the perfecting of plans for building a 5-foot tunnel, 1½ miles under Lake Erie, for the purpose of procuring a better and more abundant supply of water for the city. This work was started August 23d, 1869, and completed in March, 1874.

The rapid growth of the city demanded an extension of the plant commensurate with its needs and wants. During his term of service the buildings and pumping machinery have been increased from a daily capacity of 8 000 000 to 70 000 000 gallons, in addition to the removal of the Cornish engines to the eastern part of the city, where they now supply the water to the High-Service District. Two reservoirs have also been built, one low-service reservoir of 80 000 000 gallons capacity, 170 feet above, and one high-service reservoir of 40 000 000 gallons, 325 feet above, the level of Lake Erie.

The demands of the city for water in periods of extreme heat and cold called for an increase in tunnel capacity; and in April, 1888, work was started on a new tunnel 7 feet in diameter under Lake Erie, to

* Committee to prepare Memoir, M. W. Kingsley, M. Am. Soc. C. E.

the present crib or intake, a distance of about 9 000 feet from the pumping works, which was completed and in use in January, 1891. On account of many obstacles encountered in the construction of this tunnel, caused by gas, quicksand and the increased size of the tunnel over the one finished in 1874, it was deemed prudent to adopt the use of compressed air, with which the tunnel was satisfactorily completed. The total extension of the water mains, January, 1892, amounted to 343 miles of pipe, and the total amount of service connection amounted to 37 500.

During all the care of a busy life, Mr. Whitelaw always found time to devote to the interests of civil engineering, taking an active part in the formation and growth of the Civil Engineers' Club of Cleveland, Ohio, of which body he was twice elected to hold the responsible and honorable position of President in the years of 1887 and 1888.

His courteous, firm, but unassuming, manner, his sterling integrity and keen sense of justice, caused him to be held in universal respect and esteem by the large number of his subordinates as well as by the citizens of Cleveland.

His professional advice was often sought, both at home and abroad. To the younger members of the profession he was especially kind, always giving them the benefit of his experience, together with encouraging words and hopeful advice.

As an engineer these are the monuments of John Whitelaw. As a man, the confidence of the great public, never withdrawn, never unshaken through such a long public career, is a glorious epitaph.

Mr. Whitelaw was elected a Member of the American Society of Civil Engineers, February 5th, 1873.

JOHN LOCKWOOD, Assoc. Am. Soc. C. E.

DIED DECEMBER 9TH, 1891.

John Lockwood was born December 3d, 1814, at Ballston Spa, N. Y. After some years of business life and preliminary training as an engineer, he entered into the active pursuit of his profession in 1847, in the construction of gas works.

During a long and active career he built the following works: Frankfort, Ky.; Dayton, Columbus, Zanesville, Sandusky, O.; Newport, R. I.; Dallas, Texas; New Albany, Madison, Ind.; Milwaukee, Jonesville, Wis.; West Troy, N. Y.; Fort Worth, Texas; Steubenville, O.; Indianapolis, Kings County, N. Y.

Mr. Lockwood prepared, also, plans and estimates for a number of water works.

A few years prior to his death he submitted plans and estimates for a salt-water supply for the City of New York, for fire and sanitary purposes. The cost of this proposed work was estimated at \$10 000 000.

Mr. Lockwood became an Associate of the American Society of Civil Engineers April 5th, 1882.

LIST OF MEMBERS.

ADDITIONS.

ASSOCIATE MEMBERS.

	Date of Election.
KERR, HENRY HAMILTON.....City Engineer, Fort Worth, Texas.....	Mar. 2, 1892

JUNIORS.

PRINCE, JULIUS....	Phoenixville, Pa.....	May 3, 1892
YEREANCE, WILLIAM BURNETT...	South Orange, N. J.....	May 3, 1892

CHANGES AND CORRECTIONS.

MEMBERS.

ALLEN, KENNETH	Port Richmond, Richmond Co., N. Y.
BEAHAN, WILLARD	With Contractors, New Central Bridge, Eighth Ave. and 155th St., New York City.
BOOTH, WILLIAM H	100 Bunhill Row, London, E. C., England.
CORNELL, GEORGE B.....	Chief Engineer East River Bridge Co., 120 Broadway, New York City.
FIELD, BURR K.....	Vice-President The Berlin Iron Bridge Co., Berlin, Conn.
FULTON, JOHN A.	4146 Berkley Ave., Chicago, Ill.
JACKSON, J. M	Lemont, Cook Co., Ill.
JOHNSTON, H. G	General Manager American Well and Prospect- ing Co., Salina, Kans.
KEATING, E. H ...	City Engineer, Toronto, Canada.
MASON, S. D	Assistant Purchasing Agent N. P. R. R., Tacoma, Wash.
OSBORN, FRANK C.....	452 The Arcade, Cleveland, Ohio.
RICE, GEORGE S.....	95 Milk St., Boston, Mass.
RICHARDSON, B. FRANK.....	1216 South 22d St., Philadelphia, Pa.
RUSSELL, N. E	Hoosick Falls, N. Y.
SCHAUB, JULIUS W.....	1614 Second Carondelet Ave., St. Louis, Mo.
STRIEDINGER, JULIUS H	1209 Jones St., San Francisco, Cal.

- TUCKER, HOOD Civil Engineer C. P. Improvement Co., Deermont, Tenn.
 VAUGHN, GEORGE W. Chief Engineer Santa Fé, Prescott & Phoenix Ry., Prescott, Ariz.
 WARD, JOHN F. 1919 Seventh Ave., New York City.

ASSOCIATE MEMBERS.

- COCKROFT, C. A. Box 921, Montreal, Canada.
 EARL, GEORGE G. 61 Carondelet St., New Orleans, La.
 EASBY, M. WARD Media, Pa.
 FREASE, HARRY. The Canton Stoneware Co., Canton, Ohio.
 GAHAGAN, WALTER H. (Care E. L. Corthell) The Temple, Chicago, Ill.
 STITES, A. C. 931 The Rookery, Chicago, Ill.

ASSOCIATES.

- COMPTON, ALFRED G. 40 West 126th St., New York City.
 HANDY, FRANK W. 32 Metropolitan Block, Chicago, Ill.

JUNIORS.

- CLARKE, ST. JOHN. 196 Van Houten St., Paterson, N. J.
 FOWLER, C. E. 525 Bryson St., Youngstown, Ohio.
 SHERMAN, C. W. 9 East Buffalo St., Ithaca, N. Y.
 SPEIDEL, H. S. 196 Van Houten St., Paterson, N. J.
 WILSON, F. W. Room 42, Grand Central Station, New York City.

ADDITIONS TO LIBRARY AND MUSEUM.

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| <p>From Association of Engineering Societies:
 Descriptive Index of Current Engineering Literature.</p> <p>From Boston Public Library:
 Bulletin for July, 1892.</p> <p>From Cornell University, Agricultural Station:
 On the Comparative Merits of Steam and Hot Water for Greenhouse Heating.</p> <p>From J. T. Fanning, C. E., Minneapolis, Minn.:
 Report on the Public Water Supply and Electric Lighting of the City of Austin, Texas.</p> <p>From William Hamilton, C. E., Toronto, Can.:
 Annual Report of the Superintendent of Toronto Water Works for the year ending December 31st, 1891.</p> | <p>From A. W. Howitt, Secretary for Mines, Victoria:
 Annual Report of the Secretary for Mines (Victoria) for 1891.</p> <p>From Institution of Civil Engineers, London:
 Abstracts of Papers in Foreign Transactions,
 Boilers of Locomotive Engines,
 Distribution and Measurement of Illumination,
 Measurement of High Temperatures,
 Nagpur Water Works Extension,
 Speed and Power of Locomotives.</p> <p>From Iowa State Board of Health:
 Monthly Bulletin for July, 1892.</p> <p>From Liverpool Engineering Society:
 Transactions, Vol. XIII.
 List of Members.</p> |
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- From John A. Ockerson, U. S. Asst. Eng.:
Map of the Mississippi River from Cairo to Donaldsonville. (Blue Prints.)
- From Royal Technical High School in Hanover:
Programme for 1892-93.
- From Royal Technical High School in Aachen;
Programme for 1892-93.
- From Prof. Palmer C. Ricketts, C. E., Troy, N. Y.:
Report of a System of Protection for the City of Corning, N. Y., from Floods in the Chemung River.
- From T. Guilford Smith, Vice-Prest. N. Y. Car Wheel Co., Buffalo, N. Y.:
The American Chilled Car Wheel "Machined."
"Machined" Car Wheels.
Recent Improvement in Car Wheels, Sections and Mechanical Conditions of Car Wheels.
The Car Wheel Question.
Brake Service and Car Wheels.
Chilled Cast Iron vs. Steel Tired Wheels.
- From Street Railway Publishing Co.:
Street Railways; Their Construction, Operation and Maintenance.
- From E. H. Stone, M. Inst. C. E., Simla, India:
General Directory and Railway List. Locomotive and Carriage Superintendents for India, to January 1, 1892.
- From J. W. Twigg, Dublin, Ireland:
Memorial to the School Board for London on a Decimal System of Currency, Weights and Measures.
Decimal Coinage, Weights and Measures Popularly Explained.
- From U. S. Department of Agriculture. Weather Bureau:
Monthly Weather Review, May, 1892.
Bulletin No. 1.—Notes on the Climate and Meteorology of Death Valley, Cal.
Bulletin No. 2.—Notes on a New Method for the Discussion of Magnetic Observations.
Bulletin No. 3.—A Report on the Relations of Soil to Climate.
Irrigation and Water Storage in the Arid Regions.
- From U. S. Department of State:
Special Consular Reports; Canals and Irrigation in Foreign Countries,
Coal and Coal Consumption in Spanish America.
Gas in Foreign Countries.
Reports of the Consuls, No. 139, April, 1892. No. 141, June, 1892.
- From U. S. National Museum:
The Log of the Savannah.
Life History of North American Birds.
- From U. S. Navy Department:
Pilot Chart of North Atlantic Ocean, Aug., 1892.
Ordnance Notes, No. 60.
- From U. S. War Department, Chief Signal Office:
Report of the Chief Signal Office of the Army on the Climatic Conditions of the State of Texas.
- From U. S. War Department, Chief of Engineers:
Proposals and Specifications as follows:
For Dredging through Cherry Island Flats, Delaware River; a Channel from Main Ship Canal to Curtis Bay, Baltimore Harbor, Md.; at Occoquan Creek, Va.; in the Potomac River; in Rouge River, Mich.; in Saginaw River, Mich.; in Black River, Mich.; in Thunder Bay River, Mich.; at the mouth of Saco River, Me.
For Construction of Rip Rap Jetty at the Mouth of Saco River, Me., and at Nominy Creek, Va.; of Breakwater at New Haven, Conn.; of Stone Wharf at the Mouth of Kennebunk River, Me.; of three miles of Illinois and Mississippi Canal; of Pier Extension at Kewanee, Wis.
For Furnishing Cement for Fort Warren, Boston Harbor, Mass.; Rip Rap Stone at Occoquan Creek, Va., and Potomac.
River at Washington, D. C.; Gravel for Potomac River, Wash., D. C.; Stone Mattress, Fascine and Pile Work in Savannah River, Ga.; Iron Work for Lock Gates in the Great Kanawha River, W. Va.; Building Stone for Potomac River, Wash., D. C.; Material for Movable Dam in Ohio River, Pa.; Dredge for Little Rapids, Mich.
- From D. Van Nostrand Co., N. Y.:
The Microscopical Examination of Potable Water.
- From Hon. Francis E. Warren, Wash., D. C.:
Irrigation and Reclamation of Arid Lands.

BOOK NOTICES.

THE MICROSCOPICAL EXAMINATION OF POTABLE WATER.

By Geo. W. Rafter, Member of the Rochester Academy of Science.
4 x 6 inches, pp. 160. Van Nostrand Science Series, No. 103. D. Van Nostrand Company, N. Y., 1892. (Price 50 cents.)

The author of this work claims that "it may be taken as fairly representing the state of the art, of which it professes to treat, at the date of issue."

He gives practical directions for making qualitative and quantitative examinations, and

describes many of the microscopical organisms often found in potable water.¶ He also gives the different methods of examination in use by various biologists.

A list of books, journals and miscellaneous papers bearing on the subject, is given at the end of the volume.

STREET RAILWAYS; THEIR CONSTRUCTION, OPERATION AND MAINTENANCE.

A Practical Handbook for Street Railway Men. By C. B. Fairchild, Editor of "The Street Railway Journal." 9½ x 12 inches, cloth, pp. 442. Street Railway Publishing Company, N. Y. 1892.

This book is designed—and its object seems well carried out—"as a hand-book for those building or operating either electric, cable, horse or elevated lines, to which reference can be had as occasion demands." A mass of information upon the history, development, construction and maintenance of street railways is here collected, which will be of value to those seeking information on these subjects.

Its chapters are given to Electric Traction, Cable Traction, Horse Traction, Steam, Air and Gas Motors, Inclined Planes, Elevated Roads, Car Building, Track Construction, Discipline and Rules, Charters and Franchises, Book-Keeping and the Classification of Accounts.

Many illustrations through the text add interest and value.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—September, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

SEPTEMBER 7TH, 1892.—The Society met at 20 o'clock, President Mendes Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected: As Members: Cary Calvert Barr, Jersey City, N. J.; George William Catt, New York City; James Edgar Denton, Hoboken, N. J.; Theodore Semenovitch Schmeleff, Reval, Russia. As Associate Members: Walter Eugene Angier, Memphis, Tenn.; Austin Lord Bowman, Roanoke, Va.; Loomis Eaton Chapin (elected Junior December 3d, 1884), Canton, Ohio; Edward Wilkins Dewey, New York City; Frank Lynwood Garrison, Philadelphia, Pa.; Alva Jarvis Grover, Omaha, Neb.; Dunkin Wirgman Hemming, Baltimore, Md.; Peter Elbert Nostrand, Brooklyn, N. Y.; Max Ernst Robert Toltz, St. Paul, Minn.; Maurice Augustus Vielé (elected Junior February 4th, 1891), New York City; George Smedley Webster, Philadelphia, Pa.

A paper on "The Increasing Cost of Railway Tie Renewals," by Benjamin Reece, M. Am. Soc. C. E., was read, and the subject discussed by President Cohen.

A paper on "Thin Floors for Bridges," by Albert F. Robinson,

M. Am. Soc. C. E., was then read, and was discussed by Messrs. T. C. Clarke, George S. Morison, J. J. R. Croes and G. Leverich.

SEPTEMBER 21ST, 1892.—The Society met at 20 o'clock, Director L. L. Buck in the chair; F. Collingwood, Secretary. Announcement was made of the deaths of Sidney Dillon, F. Am. Soc. C. E., on June 9th, 1892; John Whitelaw, M. Am. Soc. C. E., on June 16th, 1892; and Past-President James B. Francis, on September 18th, 1892.

A paper on "The Strength and Weathering Qualities of Roofing Slates," by Mansfield Merriman, M. Am. Soc. C. E., was presented by the author, and discussed by Messrs. C. B. Brush and Professor Merriman.

Papers on "Test of Power Required to Drive Electric Street Cars and Total Efficiency of the Motor," by Louis B. Bonnett, Jun. Am. Soc. C. E., and on "Motive Power for Street Railways," by Alfred F. Sears, M. Am. Soc. C. E., were presented by the authors, and discussed by Messrs. C. B. Brush, L. B. Bonnett, C. E. Emery, A. P. Dodge, R. L. Harris, S. E. Jarvis, W. H. Breithaupt, and A. F. Sears.

OF THE BOARD OF DIRECTION.

SEPTEMBER 6TH, 1892.—A committee was appointed to report on the advisability of changing the badge of the Society.

The following minute was adopted and ordered to be spread on the minutes:

Whereas, The death of William P. Shinn, Past-President of the American Society of Civil Engineers, has recently been announced, therefore—

Resolved, That the following memorial be spread upon the minutes of the Board of Direction of the American Society of Civil Engineers.

It is intended to put on record, by these lines, the fact that this Board is deeply conscious of the loss which the Society has sustained in the demise of Mr. Shinn. His ability as a parliamentarian, and his legal knowledge and experience respecting corporate matters, were recognized by all.

The present Constitution of the Society was, to a considerable extent, the outgrowth of his labor; the value of which will probably be the more fully appreciated as the Society grows and expands under its wise and liberal policy.

The extent of the services rendered by Mr. Shinn to engineers and to the engineering societies in general, would be difficult to over-estimate; as, for instance, his connection with the remarkably successful excursion of the British Iron and Steel Institute during 1890. It was under Mr. Shinn's hospitable roof that Holley made that memorable impromptu speech which grows the more beautiful as the years roll by, and it was jointly to him and to his wife that the attendance

of ladies at our Annual Convention was inaugurated, an innovation which has added much to the social prominence of our society.

In this connection, too, it seems apropos to state that Mr. Shinn's last attendance at a regular meeting of the Board of Direction was during the evening of March 1st, 1892, at which time he came to report for his committee relative to the Columbian Exposition matters. From that meeting he excused himself early upon the plea of illness, which his appearances at the time fully bore out, as those well remember who were then present. As subsequent events proved, he was even then "within the dark shadow."

Mr. Shinn's ability as an engineer brought to him the highest honor which the Society can tender—its Presidency—while his services to the Society, both as a Member and as a Director, should long keep his memory before us.

SEPTEMBER 7TH, 1892.

The following recommendations of the Publication Committee were adopted: "That papers shall, as soon as possible after acceptance by the Publication Committee, be read at a regular meeting of the Society, and shall then be promptly published in the *Transactions* and immediately distributed to the members; and that the discussion of any paper shall be separately published in a subsequent number of the *Transactions*, as soon as possible after the publication of the paper."

A report from the Members of the Society forming part of a Joint Committee of the four National Societies on the subject of a general welcome to visiting foreign engineers in 1893 was presented by the Chairman. The report stated that it was not deemed expedient to maintain outside headquarters in the City of New York, but that a general letter of welcome should be sent in the name of the four national societies, viz.:

The American Society of Civil Engineers;
The American Society of Mechanical Engineers;
The American Institute of Mining Engineers; and
The American Institute of Electrical Engineers,

advising engineers that the houses of the several societies in New York would be open to them, a hearty welcome accorded, and efforts made to facilitate the objects of their visit.

The form of such a letter was presented by the Committee, which, together with the report, was adopted.

LIST OF MEMBERS.

ADDITIONS.

HONORARY MEMBER.

	Date of Election.
WILSON, WILLIAM HASELL.....President P. & E. R. R., 233 South Fourth St., Philadel- phia, Pa.....	Aug. 2, 1892

MEMBERS.

BARR, CARY CALVERT.....240 Eleventh St., Jersey City, N. J.....	Sept. 7, 1892
CATT, GEORGE WILLIAM.....Chief Engineer San Francisco Bridge Co., World Bldg., New York City.....	Sept. 7, 1892
VICTORIN, ANTHONY.....Watervliet Arsenal, West Troy, N. Y.....	Feb. 3, 1892

ASSOCIATE MEMBERS.

ANGIER, WALTER EUGENEWest Swanzy, N. H.....	Sept. 7, 1892
BOWMAN, AUSTIN LORD.....P. O. Box 323, Roanoke, Va...	Sept. 7, 1892
CHAPIN, LOOMIS EATON.....City Engineer, City Hall, { J... Canton, Ohio { A.M.	Dec. 3, 1884 Sept. 7, 1892
GARRISON, FRANK LYNWOOD....328 Chestnut St., Philadelphia, Pa.....	Sept. 7, 1892
HARDY, HARRY.....(Care Read and Campbell), Puebla, Mexico.....	June 1, 1892
HEMMING, DUNKIN WIRGMAN....12 E. Huntingdon Ave., Balti- more, Md.....	Sept. 7, 1892
TOLTZ, MAX ERNEST ROBERT....Bridge Engineer, G. N. Ry., St. Paul, Minn.....	Sept. 7, 1892
VIELÉ, MAURICE AUGUSTUS....476 West 152d St., New { J... York City..... { A.M.	Feb. 4, 1891 Sept. 7, 1892
WEBSTER, GEORGE SMEDLEY....Survey Bureau, City Hall, Phil- adelphia, Pa.....	Sept. 7, 1892

JUNIORS.

HEWITT, CONRAD.....90 Nassau St., New York City..	Apr. 5, 1892
LUDWIG, JULIUS ALFRED.....Pencoyd Bridge and Construc- tion Co., Pencoyd, Pa.....	May 31, 1892
NEUMEYER, ROBERT ENGLER....Borough Engineer, Bethlehem, Pa.....	May 31, 1892
SJÖSTRÖM, IVAR LUDWIG.....Northern Pacific R. R., Che- halis, Wash.....	Sept. 6, 1892

ADDITIONS TO LIBRARY AND MUSEUM.

- From American Institute of Mining Engineers, N. Y.:
Transactions, Vol. XX, 1891.
- From Robert A. Cummings, C. E., Columbus, Ohio:
General Specifications of Wiring for Electric Light in Buildings.
- From George H. Ely, C. E., Cleveland, Ohio:
The Great Lakes of North America.
- From E. Sherman Gould, C. E., N. Y.:
Album of Photographs of Albear Canal, Cuba.
- From Henry E. Gregory, Secretary, Niagara Falls, N. Y.:
Eighth Annual Report of the Commissioners of the State Reservation at Niagara, for the fiscal year from October 1st, 1890, to September 30th, 1891.
- From Hon. Thomas Harlan, Newark, N. J.:
Annual Report of the Committee on the Department of Water of the Board of Street and Water Commissioners of the City of Newark, N. J., for the year 1891.
- From Institution of Civil Engineers, London, Eng.:
Minutes of Proceedings, Vols. CIX, CX. Subject Index, Vols. LIX to CX.
- From Imperial University of Japan, Tokio:
Calendars for the years 1890-91, 1891-92.
- From Illinois Society of Engineers and Surveyors:
Report of the Seventh Annual Meeting.
- From Institution of Mechanical Engineers, London, Eng.:
Proceedings of the Institution, May, 1892.
- From Iron and Steel Institute, London, Eng.:
Journal No. 1, 1892.
- From Wm. H. Jaques, Ord. Eng., South Bethlehem, Pa.:
Phototype of Harveyized Nickel Steel Armor Plate.
- From G. Leverich, C. E., Brooklyn, N. Y.:
Report of the Committee on Terminals New York and Brooklyn Bridge.
- From Library of Harvard University, Cambridge, Mass.:
Notes on Special Collections in American Libraries.
- From Daniel W. Meade, C. E., Rockford, Ill.:
The Qualities of Water for Domestic Supply and Boiler Use.
- From Gilbert Murdoch, C. E., St. Johns, N.B.:
Engineer and Superintendent's Report on Sewerage and Water Supply, St. Johns, N. Y.
- From Edw. P. North, C. E., N. Y.:
Le Barrage de Suresnes et la Canalisation de la Seine entre Paris et Rouen.
Plan Incline pour Bateaux de Navigation Intérieure.
- Notice sur le Canal de Saint-Dizier à Wassy.
- Paris Pont de Mer dans l'état actuel de la Seine par les Navires à Vapeur du Type Gautier.
- Bulletin Officiel du Vème Congrès International de Navigation Intérieure. Nos. 1 to 11.
- Guide Programme Vème Congrès International de Navigation Intérieure.
- From Old Bangor Slate Co., Bangor, Pa.:
Framed Photograph of Old Bangor Slate Quarry.
- From Wilhelm Prior, Publisher, Copenhagen:
Den Tekniske Forenings Tidsskrift. Nos. 1 to 6, 1891-92.
- From Royal Technical High School of Berlin:
Programme for 1892-93.
- From H. N. Ruttam, City Eng., Winnipeg, Man.:
Report on Storage Battery and Overhead Wire Systems of Electric Street Railways for the City of Winnipeg, Manitoba.
- From U. S. Geographical Survey:
Mineral Resources of the United States for 1889-90.
Thirty-two Maps of U. S. Geographical Survey.
- From U. S. Naval Observatory:
Washington Observations, 1888.
Appendix II, Magnetic Observations at U. S. Naval Observatory, 1891.
- From U. S. Navy Department:
Pilot Chart of the North Atlantic Ocean, September, 1892.
- From U. S. Treasury Department, Bureau of Statistics:
Report on the Internal Commerce of the United States, for the year, 1891.
- From U. S. War Department, Chief of Engineers. Proposals as follows:
For Dredging Red Hook Shoal, in Butter-milk Channel, N. Y.; Passaic and South Rivers, N. J.; Green Bay, Mich.; Kingston Harbor, Mass.; Oakland Harbor, Cal.; Manchester Harbor, Mass.; Mystic River, Mass.; Plymouth Harbor, Mass.; Gloucester Harbor, Mass.; Salem Harbor, Mass.; Frankfort Harbor, Mich.; Norfolk Harbor, Va.; Duluth Harbor, Mich.; Boston Harbor, Mass.; at Nantasket Beach, R. I.; Jeffrey's Point Channel, Mass.; Wappoo Cut, S. C.; Newtown Creek, N. Y.; Gowanus Bay, N. Y.; Charleston Harbor, S. C.; Raritan Bay, N. J.; Jamaica Bay, N. Y.; Minim Creek, S. C.; James River, Va.; Ipswich River, Mass.; Brickyard Creek, S. C.; Superior Bay, Wis.

- For Pier Extension at Sheboygan, Wis.; Naukegan, Wis.; Fort Washington, Wis.; Racine, Wis.; Kenosha, Wis.; Milwaukee, Wis.
- For Construction of Breakwater at Milwaukee, Wis.; Frost Point, N. H., and Agate Bay, Minn.; Jetty at Cumberland Sound, Ga.
- For Furnishing Cement for Fort Warren, Boston Harbor, Mass.; Stone for Delaware Breakwater; Rubble Stone for Scituate Harbor, Mass.; Sandy Bay, Mass., and Newburyport Harbor, Mass.
- For Removing Rock and Gravel in Tennessee River; Wrecks in Cooper River and Quinby Creek, S. C.; Ledge from Merrimack River, Mass., and Hingham Harbor, Mass.
- For Constructing Dams and Shore Protections between Dubuque, Iowa and Clinton, Iowa; between Genoa, Wis., and Prairie du Chien, Wis., and between Reed's Landing and Minneiska, Minn.
- For Constructing Dam and Revetment in Wappoo Cut, S. C.
- For Improvement of Savannah River, Ga., above Augusta, Ga., and Savannah Harbor, Ga.
- For Repairs to U. S. Steam Tender "Lucerne."
- For Hydraulic Dredging Steamer for N. Y. Harbor.
- From Horace G. Wadlin, Bureau of Statistics of Labor, Boston, Mass.:
Twenty-second Annual Report of the Bureau of Statistics of Labor, Mass., March, 1892.
The Annual Statistics of Manufactures.
- From Waring, Chapman and Farquhar, Newport, R. I.:
Health in Country Homes.
- From G. S. Webster, C. E., Philadelphia, Pa.:
Annual Report of the Bureau of Surveys of the City of Philadelphia, for the year ending December 31, 1891.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—October, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

OCTOBER 5TH, 1892.—The Society met at 20 o'clock, President Mendes Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members: Charles Lee Crandall, Ithaca, N. Y.; William Lafayette Darling, Helena, Montana; Augustus Jay DuBois, New Haven, Conn.; Ignacio Garfias, Mexico, Mexico; Wallace Clyde Johnson, Niagara Falls, N. Y.; Harvey Linton, Altoona, Pa.; Lewis Abel Nichols, La Salle, Ill.; Joseph Hill Paddock, Connellsville, Pa.; Charles Herbert Wright, Wilmington, Del.

As Associate Members: Robert Campbell Gemmell, Pendleton, Oregon; Francis Asbury Lyte, Kane, Pa.; Sidney Austin Parsons (elected Junior, July 2, 1890), Everett, Wash.; George Warner Sherwood (elected Junior, November 6, 1889), Riverside, Cal.; Jonas Waldo Smith, Montclair, N. J.; William de Hertburne Washington, New York City.

A committee to prepare a memoir of Past President James B. Francis was appointed.

The death on October 27th of F. O. Norton, F. Am. Soc. C. E., was announced and the President was requested to appoint a committee to prepare a memoir of him.

A paper on "Combination Bridges on the Pacific Coast," by Alfred D. Ottewell, Esq., was read, and discussed by Messrs. Cohen, G. H. Thomson, O'Rourke and Ayerig.

A paper by Alfred P. Boller, M. Am. Soc. C. E., entitled "Some Notes on Foundation Experiences" was read and discussion followed by Messrs. Brendlinger and Moran.

OCTOBER 19TH, 1892.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary.

A paper on "The Construction of a Cheap Dam Across the Roanoke River, near Salem, Va.," by Oscar Saabye, M. Am. Soc. C. E., was read, and its discussion was postponed until the next meeting of the Society.

Mr. John P. O'Donnell, M. Inst. Mech. Engrs. of England, then presented a paper on "Railroad Signalling as Applicable to Large Installations," and the subject was discussed at length by Messrs. Bradley, Crowell, Grant, H. S. Haines, Hardy, O. F. Nichols, Prout, Seaman, Voorhees and O'Donnell.

JUNE 1ST, 1892.*—The Society met at 20 o'clock. President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed, and the following candidates were declared elected: As Members: Jean Pierre Ferriere, Blida, Algiers; William Louis Marshall, Chicago, Ill.; Robert Kirkwood Martin, Baltimore, Md.; David Ashley Poynor, Dallas, Texas; Charles Walker Raymond, Philadelphia, Pa.; Horace See, New York City; Charles Edwin Wells, Chicago, Ill.

As Associate Members: Julius Baier (elected Junior, September 7th, 1887) St. Louis, Mo.; Griffith Morgan Eldridge, Americus, Ga.; Harry Hardy, Tabasco, Mexico; August Mayer, Los Angeles, Cal.; John Van Wicheren Reynders, Steelton, Pa.; Elmer Wayland Ross (elected Junior, March 5th, 1890), Providence, R. I.; Lonis Lincoln Tribus (elected Junior April 4th, 1888), New York City.

A paper, by Henry H. Quimby, M. Am. Soc. C. E., was read on "Wind Bracing in High Buildings," and discussed by Messrs. Foster, Milliken, H. W. Brinkerhoff, Crowell, Seaman, Just, Sears, Buck, Collingwood, Dunham, R. L. Harris, Bogart and Cohen.

A paper on "A New Formula for the Strength of Columns," by A. J. DuBois, Jun. Am. Soc. C. E., was also presented.

OF THE BOARD OF DIRECTION.

OCTOBER 4TH, 1892.—A committee was appointed to draft a snitable minute on the death of Past President James B. Francis.

The following report of the Nominating Committee was received:

NEW YORK, September 22d, 1892.

To the Board of Direction of the American Society of Civil Engineers:

GENTLEMEN: In accordance with Article VII, Clause 1, of the Constitution of the American Society of Civil Engineers, the Nomina-

*This notice was omitted from the Proceedings for June, 1892, and is printed here that the record may be complete.

ting Committee appointed at the last Annual Convention begs to present the following list of nominations for the offices to be filled at the next annual election:

For President, to serve one year:

WILLIAM METCALF.

For Vice-Presidents, to serve two years:

CHARLES MACDONALD,

ELMER L. CORTHELL.

For Directors, to serve three years:

FOSTER CROWELL,

HENRY G. PROUT,

WILLARD S. POPE,

FREDERICK P. STEARNS,

JOHN T. FANNING,

OLIN H. LANDRETH.

For Secretary, to serve one year:

FRANCIS COLLINGWOOD.

For Treasurer, to serve one year:

JOHN BOGART.

All the above members have accepted the nominations tendered them.

Yours respectfully,

A. FTELEY, *Chairman*.

PALMER C. RICKETTS, *Secretary*.

Action was taken in the matter of appointment of Committees to award the Norman Medal and Rowland Prize:

The following candidates were elected: As Associates: Ludlow V. Clark, Jr., Philadelphia, Pa.; Wilbur Chapman Fisk, New York City; Clifford Richardson, Washington, D. C.; Frederick Newton Willson, Princeton, N. J. As Juniors: Warren Rue Kinsey, Newark, N. J.; Morris Knowles, Montclair, N. J.; Reuben Miller, Jr., Pittsburgh, Pa.; Henry Lewis Oestreich, Jr., New York City; José Antonio Ruiloba y Dowling, Havana, Cuba; Francis Nicoll Sanders, Albany, N. Y.; Samuel Richards Thomas, Hokendauqua, Pa.; Elton David Walker, Chicago, Ill.; George Shreve Wilkins, Princeton, N. J.

MEMOIR OF DECEASED MEMBER.

GEORGE F. WRIGHT, M. Am. Soc. C. E.

DIED AUGUST 20TH, 1892.

George Francis Wright was born at Elgin, Illinois, September 30th, 1848.

Mr. Wright's early educational advantages were those of the public schools of his native place. At the age of seventeen he entered the Naval Academy at Annapolis, Md., from which he was graduated four years later. The following two years he spent in the U. S. Navy, cruising in South American waters.

Resigning from the Navy, he took up the practice of civil engineering, and, under Messrs. Cleveland and French, had charge of work in Chicago, Indianapolis and St. Paul. Later, he was employed on surveys for the Chicago and Michigan Canal.

In 1875 he moved to Santa Barbara, California, where for three years he practiced his profession. Obligated to leave the sea-coast on account of ill health, he accepted the position of Resident Engineer on the Northern Pacific Railroad, in the State of Washington. While in the Northwest he laid out the City of Spokane Falls. Subsequently, he was employed for the Union Pacific Railroad as a Locating Engineer.

In 1885 he returned to his home in Santa Barbara, and was elected City Engineer. While in this office he made a careful examination and exhaustive report of the available water supply for that city. In October, 1891, he removed his office to Los Angeles, where he was retained on several hydraulic works as a Consulting Engineer.

In May, 1892, he was engaged as Locating Engineer with the Arrowhead Reservoir Company in San Bernardino County, Cal. While vigorously pursuing his work and inspecting the field proceedings, he was attacked with hemorrhage of the lungs, and was suddenly removed from the scene of his labors.

Mr. Wright became a member of the American Society of Civil Engineers, January 4th, 1888. He was a contributor to the *Engineering News* and other like journals.

He was a quick and accurate observer, an apt student of science, a clear and logical thinker. A man of pronounced convictions and re-

solite purpose, he was able to present his case with such reason and suavity as to hold the esteem of opponents. An exacting disciplinarian, nevertheless he was kind and considerate to subordinates, who remember him with affection. His noble character gained for him the confidence and respect, not only of his professional associates, but of all who knew him.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

		Date of Election.
CRANDALL, CHARLES LEE.....	Assoc. Prof. of Civil Eng., Cornell University, Ithaca, N. Y.	J.... June 7, 1876 M... Oct. 5, 1892
DuBois, AUGUSTUS JAY.....	Prof. of Civil Eng., Sheffield Scientific School of Yale College, New Haven, Conn	J.... July 7, 1875 M... Oct. 5, 1892
LINTON, HARVEY.....	City Engineer, Altoona, Pa....	Oct. 5, 1892
SHMELEF, THEO. SEMENOVITCH...	Imperial Russian Engineer, Reval, Russia	Sept. 7, 1892
WRIGHT, CHARLES HERBERT.....	506 West Fifth st., Wilmington, Del.....	Oct. 5, 1892

ASSOCIATE MEMBERS.

GOING, ALVAH SEYMOUR.....	Box 345, Victoria, B. C	May 4, 1892
LYTE, FRANCIS ASBURY.....	Kane, Pa	Oct. 5, 1892
PARSONS, SIDNEY AUSTIN.....	First. Asst. Eng. Everett Land Co., Everett, Wash.....	J.... July 2, 1890 A. M. Oct. 5, 1892
SHERWOOD, GEORGE WARNER....	Riverside, Cal.....	J.... Nov. 6, 1889 A. M. Oct. 5, 1892
SMITH, JONAS WALDO.....	First Asst. Eng., East Jersey Water Co., Montclair, N. J.	Oct. 5, 1892
WASHINGTON, WILLIAM DE HERTBURNE..	145 Broadway, New York City.....	Oct. 5, 1892

ASSOCIATES.

CLARK, LUDLOW V., Jr.....	505 Chestnut st., Philadelphia, Pa.....	Oct. 4, 1892
FISK, WILBUR CHAPMAN	28 Nassau st., New York City..	Oct. 4, 1892
RICHARDSON, CLIFFORD.....	Office of Engr. Comr., Dist. of Columbia, Washington, D. C.	Oct. 4, 1892
WILSON, FREDERICK NEWTON....	Prof. of Descriptive Geometry, Stereo- tomy and Technical Drawing, John C. Green School of Science, Princeton, N. J.....	J.... Sept. 5, 1883 A.... Oct. 4, 1892

JUNIORS.

FENN, WILLIAM HENRY.....	Berlin Iron Bridge Co., East Berlin, Conn	May 31, 1891
KINSEY, WARREN RUE.....	10 South st., Newark, N. J....	Oct. 4, 1892
KNOWLES, MORRIS.....	Assistant Eng., East Jersey Water Co., Montclair, N. J..	Oct. 4, 1892
MILLER, REUBEN, Jr.....	Crescent Steel Co., Pittsburgh, Pa	Oct. 4, 1892
OESTREICH, HENRY LEWIS.....	127 East 931 st., New York City	Oct. 4, 1892
RUILOBA, JOSÉ ANTONIO Y DOWLING...	(Care Alberti Dowling), P. O. Box 302, Havana, Cuba	Oct. 4, 1892
THOMAS, SAMUEL RICHARDS.....	Hokendaqua, Pa.....	Oct. 4, 1892
WILKINS, GEORGE SHREVE.....	Princeton, N. J.....	Oct. 4, 1892

RESIGNATION.

MEMBER.

Date of Resignation.

OWEN, FREDERICK N	Oct. 4, 1892
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DEATHS.

FRANCIS, JAMES BICHENO.....	Elected Member, Nov. 5, 1852; Fellow, May 4, 1870; Honorary Member, April 5, 1892; died Sept. 18, 1892.
HEGEMAN, ALLEN BOGARDUS.....	Elected Member, Feb. 1, 1888; died Oct. 22, 1892.
NORTON, FREDERICK OAKFORD...	Elected Fellow, June 4, 1879; died Sept. 27, 1892.
WRIGHT, GEORGE FRANCIS	Elected Member, Jan. 4, 1888; died Aug. 20, 1892.

ADDITIONS TO LIBRARY AND MUSEUM.

- From American Institute of Mining Engineers:
 Alluvial Mining in Otago.
 Biographical Sketches of Thomas Sterry Hunt and William Powell Shinn.
 Crushing Iron Ores with the Sturtevant Mill for Concentration.
 Discussion on the Crushing of Iron Ore for Magnetic Separation.
 Fault Rules.
 Note of the Magnetic Separation of Iron Ore at the Sanford Ore Bed, Moriah, Essex County, N. Y., in 1852.
 Notes on Boiler Explosions.
 Studies in Structural Geology.
 The Calculation of Slags.
 The Control of Silicon in Pig Iron.
 The Cummings' Ore Granulating Mill.
 The Influence of Location upon the Pig Iron Industry.
 The Making of Specifications for Structural Materials.
 The Talc Industry of the Gouverneur District, St. Lawrence County, N. Y.
 The Zeehan and Dundas Smelting Works, Tasmania.
- From Ad. Bouvier, C. E., Lyons, France:
 Quelques Observations sur le Rendement Lumineux des Bees de Gaz Usuels.
- From Boquet de la Grye, C. E., Paris, France:
 Rapport Sommaire sur le Projet d'un Canal Maritime entre Paris et la Mer.
 Réplique au Conseil Général des Ponts et Chaussées.
 Déposition devant la Commission d'Enquête du Département de la Seine.
 Mémoire en Réponse aux Questions posées par le Ministre des Travaux Publics.
 Paris Port de Mer.
- From Institution of Civil Engineers, London:
 Abstracts of Papers in Foreign Transactions.
 Electric Lighting of Danger Buildings.
 Forged Steel Projectiles.
 Improvement of Otago Harbor.
 La Guira and Caracas Railway.
 Manufacture of Oil Gas.
 Sea Water for Municipal Purposes.
 Some Forms of Petroleum Engines.
 Steam Engine Governors.
 Use of Asphalt in Irrigation Works.
 Wolverhampton Sewerage Works.
 List of Members, October, 1892.
- From Emory R. Johnson, C. E., Philadelphia:
 River and Harbor Bills.
- From Master Car Builders' Association:
 Report of Proceedings, 1892.
- From M. de Mas, C. E., Paris:
 Catalogue des Publications parves sur la Navigation Intérieure.
 Exposition de Modèle, Cartes, Dessins et
- Ouvrages relatifs a la Navigation Intérieure.
- Guide-Programme Officiel de Vme Congrès International de Navigation Intérieure.
- Bulletins Officiels de Vme Congrès International de Navigation Intérieure.
 Papers (48) read before the Fifth International Congress of Interior Navigation.
- From McGill College, Montreal, Can.:
 Annual Calendar of McGill College and University, Session 1892-93.
- From James E. Mills, Quincy, Cal.:
 Stratigraphy and Succession of the Rocks of the Sierra Nevada of California.
- From John McGee, Homer City, Pa.:
 Tables of Equivalents of Metrical and English Measures, Weights, etc.
- From Ernest Pontzen, C. E., Paris:
 Notice sur la Vie et les Travaux.
- From Joseph A. Shinn, Pittsburgh, Pa.:
 Poor's Railroad Manual, 1868 to 1871, 5 volumes.
- From Surgeon-General U. S. A.:
 Index Catalogue of the Library of the Surgeon-General's Office.
- From U. S. War Department, Chief of Engineers:
 Specifications for Dredging, Excavating and Constructing—Improvement of Rivers and Harbors, 116.
- U. S. Department of Agriculture, Weather Bureau:
 Some Physical Properties of Soils in their Relation to Moisture and Crop Distribution.
 Report of the Chief of the Weather Bureau for 1891.
- From U. S. Navy Department:
 Pilot Chart of the North Atlantic Ocean, October, 1892.
- From U. S. Department of State:
 Reports from the Consuls of the United States, July, August, 1892.
- From L. F. Vernon-Harcourt, C. E., London:
 Improvement of the Maritime Portion of Rivers, including their Outlets.
- From Arthur Winslow, State Geologist, Jefferson City, Mo.:
 Bulletins Nos 2 3 and 4 of the Geological Survey of Missouri.
 A Preliminary Report on the Coal Deposits of Missouri.
 The Higginsville Sheet of Lafayette Co., Mo.
- By Purchase:
 Report on Electric Railway Bills in Parliament.
 Bulletin No. 1 of the Geological Survey of Missouri.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—November, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

NOVEMBER 2D, 1892.—The Society met at 20 o'clock, President Cohen in the chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members: William Waller Carson, Knoxville, Tenn.; Horace Harding, Tuscaloosa, Ala.; Benjamin Southern Wathen, Dallas, Texas. As Associate Member: John Henry Kinealy, St. Louis, Mo.

A paper on "Electric Rock Blasting—The American Method," by William L. Saunders, M. Am. Soc. C. E., was read and discussed by Messrs. Spencer Miller, Samuel Whinery, A. McC. Parker and E. P. North.

Announcement was made of the deaths of George F. Wright, M. Am. Soc. C. E., on August 28th, 1892, and Allen B. Hegeman, M. Am. Soc. C. E., on October 22d, 1892.

NOVEMBER 16TH, 1892.—The Society met at 20 o'clock, Vice-President Brush in the chair; F. Collingwood, Secretary.

James Owen, M. Am. Soc. C. E., read his paper on "The Controverted Questions in Road Construction," which was discussed by Messrs. E. P. North, C. B. Brush, F. Collingwood and James Owen.

OF THE BOARD OF DIRECTION.

NOVEMBER 1ST, 1892.—Applications were considered ; Committees to award the Norman Medal and the Rowland Prize were appointed, and general business transacted. The following candidates were elected : As Fellows: Charles Marvin Everest, Rochester, N. Y. ; Frederick Aaron Lovecraft, New York City.

LIST OF MEMBERS.

ADDITIONS.

MEMBERS.

	Date of Election.
CARSON, WILLIAM WALLER....Prof. of Civil Eng., University of Tennessee, Knoxville, Tenn..	Nov. 2, 1892
DENTON, JOHN EDGAR.....Prof. Experimental Mechanics, Stevens' Institute, Hoboken, N. J.....	Sept. 7, 1892
HARDING, HORACETuscaloosa, Ala.....	Nov. 2, 1892
JOHNSON, WILLIAM CLYDE....170 Main St., Niagara Falls, N. Y.	Oct. 5, 1892
WATHEN, BENJAMIN SOUTHERN..Resident Engineer, Texas and Pacific R. R., Dallas, Texas...	Nov. 2, 1892

ASSOCIATE MEMBERS.

GENMELL, ROBERT CAMPBELL..Pendleton, Ore.....	Oct. 5, 1892
MAYER, AUGUST14 Burdick Block, Los Angeles, Cal.....	June 1, 1892

JUNIORS.

SANDERS, FRANCIS NICOLL....Box 127, Johnston, Pa.....	Oct. 4, 1892
WALKER, ELTON DAVID.....403 Western Bank Note Bldg., Chicago, Ill.....	Oct. 4, 1892

DEATH.

MORRIS, ROBERT C.....	Elected Member, Jan. 7, 1874; died Nov. 8, 1892
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ADDITIONS TO LIBRARY AND MUSEUM.

- From Hon. John Bogart, New York:
Terms of Sale and Specifications for the
Construction of a Rapid Transit Rail-
road in the City of New York.
- From Canadian Society of Civil Engineers,
Montreal:
Transactions. Vol. VI, Part 1. January
to June, 1892.
- From James Duane, New York:
Reports of the Department of Public
Works of the City of New York, 1883,
1885, 1887, 1888, 1889, 1890, 1891.
- From A. Huet, Hague, Holland:
The Increasing Dimensions of Ocean
Steamers.
Geschiedkundig Overzicht van de Ont-
werpen voor de Doorgraving van Hol-
land op zijn smalst. 1629-1885.
- From Institution of Engineers and Ship-
builders in Scotland:
Vol. XXXV. 1891-92.
- From Institute of Engineers, Santiago, Chili:
Anales del Instituto de Ingenieros. 1888-
1892. Vols. I to IV.
- From E. Knichling, Rochester, N. Y.:
Sixteenth Annual Report of the Execu-
tive Board, Rochester, N. Y., 1892.
- From Mansfield Merriman, South Bethlehem,
Pa.:
Final Formulas for the Algebraic Solution
of Quartic Equations.
- From New York State Library, Albany, N. Y.:
Regent's Report of the University of the
State of New York for 1890.
- From W. B. Parsons, New York:
Terms of Sale and Specifications for the
Construction of a Rapid Transit Rail-
road in the City of New York.
- From W. A. Pratt, Baltimore, Md.:
Baltimore and Ohio Railroad Company.
Rules for Trackmen. September, 1891.
Maintenance of Way Standards, 1891.
- From Royal Society of Canada, Ottawa:
Proceedings and Transactions. Vol. IX,
1891.
- From Sanitary District of Chicago:
Proceedings of the Board of Trustees,
September 14th, 1892.
- From S. E. Tinkham, Secretary, Boston, Mass.:
Constitution and By-Laws and List of
Members of Boston Society of Civil
Engineers, November, 1892.
- From John C. Trautwine, Jr., Philadelphia,
Pa.:
The Civil Engineer's Pocket-Book, 1892.
- From U. S. Department of State:
Reports from the Consuls of the United
States, September, 1892.
Commercial Relations of the United
States with Foreign Countries during
the years 1890 and 1891.
- From U. S. Treasury Department, Bureau of
Statistics:
Quarterly Report of the Chief of the
Bureau of Statistics, relative to the
Imports, Exports, Immigration and
Navigation.
- From U. S. War Department, Chief of Engi-
neers:
Twenty-four Specifications for Improve-
ment of Rivers and Harbors.
- From U. S. Weather Bureau:
Report on the Climate of California and
Nevada, with particular reference to
Questions of Irrigation and Water Stor-
age in the Arid Regions.

American Society of Civil Engineers.

PROCEEDINGS.

Vol. XVIII.—December, 1892.

MINUTES OF MEETINGS.

(Abstract of such as may be of general interest to the Society.)

OF THE SOCIETY.

DECEMBER 7TH, 1892.—The Society met at 20 o'clock, President Cohen in the Chair; F. Collingwood, Secretary. Ballots were canvassed and the following candidates were declared elected: As Members, William Henry Brown, Philadelphia, Pa.; Howard Constable, New York City; Edmund Gybbon Spilsbury, Trenton, N. J. As Associate Members: Henry Furlong Baldwin, Chicago, Ill.; Edward Thomas McConnell (elected Junior, May 5th, 1891), Indianapolis, Ind.

The death of Robert C. Morris, M. Am. Soc. C. E., on November 8th, 1892, was announced.

A paper by James D. Schuyler, M. Am. Soc. C. E., on "The Use of Asphaltum for Reservoir Linings," was read and discussed by Messrs. Brush, Crowell, Fergusson, Flagg, R. L. Harris, O'Rourke, Parsons and Whinery.

William Barclay Parsons, M. Am. Soc. C. E., read a paper on "Borings in Broadway, New York," and discussion followed by Messrs. Brush, Collingwood, Flagg, Charles Warren Hunt, and the author.

DECEMBER 21ST, 1892.—The Society met at 20 o'clock, Foster Crowell, M. Am. Soc. C. E., in the chair; F. Collingwood, Secretary. A paper by Urban H. Broughton, Esq., on "The Shone Hydro-Pneumatic System of Sewerage," was read by the author, and discussed by Messrs. Croes, Crowell, Flagg, Fteley, George S. Greene, Parsons, Saunders, Stearns, and the author.

The death of J. N. DuBarry, M. Am. Soc. C. E., on December 17th, 1892, was announced.

OF THE BOARD OF DIRECTION.

DECEMBER 6TH, 1892.—Applications were considered; action taken in regard to members in arrears.

The following resolution was received and ordered spread upon the minutes.

"Whereas, The American Society of Civil Engineers has had the misfortune to lose by death, Past President and Honorary Member James B. Francis,

"Resolved, That the Board of Direction hereby records its sincere appreciation of the services rendered to the Society by Mr. Francis, and particularly in his connection with its management; as one of its founders in 1852; as its Vice-President for three years; as its President for nearly fifteen months, and as a member of the Board since the adoption of the present constitution.

"He was always ready with sagacious counsel and admirable suggestion, and gave to the welfare of the Society all the resources of his remarkable experience and shrewd tact.

"His interest continued unabated from the very inception of the Society until his death.

"His contributions to the *Transactions* and Discussions were numerous and valuable, not only during his active membership, but continuing after he became an Honorary Member, although he then well merited repose and freedom from professional activity.

"He was particularly interested in the Library of the Society, and many of its best collections are largely due to his suggestions and contributions.

"By the active part he took at the Conventions he added greatly to the enjoyment of those occasions and encouraged closer intercourse among our members.

"As, perhaps, the American Civil Engineer best known in all parts of the world, his active interest, always expressed when occasion demanded, greatly increased the general appreciation and knowledge of the Society.

"He has filled a large place in our affection and goes from among us respected and regretted by all."

MEMOIRS OF DECEASED MEMBERS.

JAMES LINGAN RANDOLPH, M. Am. Soc. C. E.*

DIED SEPTEMBER 17TH, 1888.

James Lingan Randolph was born January 11th, 1817, at Georgetown, District of Columbia. He became a Member of the American Society of Civil Engineers on March 1st, 1882, and died at his country home in Prince George's County, Maryland, on September 17th, 1888.

The preparation of Mr. Randolph for his profession was, like that of most of his contemporaries, unaided by the carefully arranged curriculum of a technical school. He was placed at an early age at the private academy of John McLeod, in Washington City. McLeod was the type of the old Irish schoolmaster, who attached more importance to Latin and Greek than to mathematics or the physical sciences, and whose energy was principally devoted to instilling into the brains of his pupils a more or less thorough knowledge of the dead languages. In accomplishing this he by no means despised the stimulus of the traditional "birch" or "ferrule." In fact, he is said to have been much addicted to the use of a still more formidable instrument, the "cow-hide."

The motto of the academy, "Order is Heaven's First Law" was so inscribed on the outside of the building as to catch the eye on first approach to the school precincts, and the pupils had its precept impressed upon their memories by the same vigorous process as was used with regard to their studies.

Notwithstanding the roughness of the methods, young Randolph must have made fair progress, for he was enabled to enter Georgetown College at the age of fifteen. Here he continued some three years. The college course does not seem, however, to have been on lines to satisfy the needs of a young engineer, for he availed himself in the following year of the instruction of a private tutor in mathematics, and at nineteen, through the interest of General Abert, Chief of Engineers, United States Army, he received an appointment in the Engineer Corps of the Baltimore and Ohio Railroad Company, of which at that time Jonathan Knight was Chief Engineer, and Benjamin H. Latrobe, Engineer of Location.

The main stem of the railroad had just then been extended to a point on the Maryland side of the Potomac, opposite Harper's Ferry, while the "Washington Branch" of the road, having been completed

* Prepared by Mendes Cohen, Pres. Am. Soc. C. E., and George B. Hazlehurst, M. Am. Soc. C. E.

and opened the previous year, the Engineer Corps was charged with the duty of locating the extension of the main stem to Cumberland.

On this work, and its subsequent construction and extension to the Ohio River, Mr. Randolph was engaged almost continuously, obtaining his first responsible charge as Resident Engineer in 1839, when twenty-two years of age. He subsequently had charge of the location of the line across the "Great Back-Bone Mountain" of the Alleghenies, with its grade of 17 miles of 116 ft. per mile; and later as Division Engineer directed the construction of the work along the Tygart's Valley and Monongahela Rivers.

While thus engaged he found time to design and construct for a local company the wire suspension bridge which crosses the Monongahela River at Fairmont, W. Va.

Upon the completion of the work on his division, followed in a few months (January, 1853), by the opening of the whole line to the Ohio River at Wheeling, W. Va., and the disbanding of the entire engineer corps, he severed his connection with the Baltimore and Ohio Railroad and sought service elsewhere.

For a period of eight years he was engaged in varied railroad work upon the Sunbury and Erie Railroad, the Blue Ridge Railroad of South Carolina, and the Pensacola and Georgia Railroad, at the end of which the breaking out of the Civil War brought him back to his Virginia home. He was soon again in the service of the Baltimore and Ohio Railroad Company, being appointed in 1863 to take charge of the construction of the two Baltimore and Ohio bridges over the Ohio River, the one at Bellaire, and the other at Parkersburg. He continued in this service as Chief Engineer of the road until 1883, building during the interval the Metropolitan Branch of the Baltimore and Ohio Railroad, and designing and constructing numerous iron bridges.

In 1883 the active duties of Chief Engineer of the road were placed on younger shoulders and Mr. Randolph retired to the position of Consulting Engineer. The design and construction of the iron bridges still continued, however, under his active control, and so remained till death severed his connection with the service.

Mr. Randolph possessed traits of character which made him loved by his fellows. Always courteous and dignified in manner, he never failed to have the respect of all with whom he held relations. He maintained discipline rather by inspiring affectionate obedience than by stern and enforced command, while his kind and considerate bearing to the younger men about him, his readiness to help them on occasion and the friendly interest he took in their behalf induced in return a tender feeling of devotion on the part of those who were under his direction which toward the last amounted almost to reverence, so deep was their respect.

One who served as an assistant under him writes: "He was always

looking after the welfare of 'his boys,' securing employment for those needing it, and advancement for those deserving it, while their shortcomings were quietly and in a kindly spirit brought to their notice."

His fund of general knowledge was large. Much of it acquired by reading and study, more by close observation and an inherent faculty of analysis, which led him to study every subject he took up until he had thoroughly mastered it. This process of reasoning, doubtless developed by his early training, when engineering text books were scarce, and those who knew how to prepare them few, served him well in solving his engineering problems. It made him self-reliant.

His home life was a happy one. He was endeared to the family circle by the same traits which attracted others. Simple in his tastes, his books, his tools and his garden, with the society of his family and friends, completed his happiness. The last two years of his life were mostly passed in the quiet enjoyment of his home, and there in the midst of his family the thread of his life was suddenly broken by disease of the heart, leaving to his children the legacy of a good and honored name and a cherished memory to his friends.

FREDERICK O. NORTON, F. Am. Soc. C. E.*

DIED SEPTEMBER 27TH, 1892.

Frederick O. Norton was born at Eastport, Maine, in 1838. He was a man of sterling principles, and demonstrated through a long business career that truthfulness and honesty are ever the key to success. Coming to New York when a young man and unaided by influential friends, he secured a position for himself as clerk in the office of Messrs. Delafield & Baxter, manufacturers of cement. He soon afterward was sent to their works, and became General Superintendent. Feeling that he was capable of manufacturing on his own account, he shortly returned to New York, and, interesting Messrs. Johnston & Norris, bankers, in his enterprise, proceeded to start a mill at High Falls, N. Y., where the first F. O. Norton cement was made. The business grew rapidly until 1871, when quarries were purchased at Binnewater, on the line of the Walkill Valley Railroad, and an extension plant was erected at that point. The business of these works was conducted in person by Mr. Norton until the past year, when, owing to the precarious condition of his health, it was put into the hands of the Corporation, now known as the F. O. Norton Cement Company.

It has been justly said that Mr. Norton did more than any other

* Memoir prepared by Chas. M. Harris, Assoc. Am. Soc. C. E.

one man in the country to raise the quality of Rosendale cement. He certainly was the first to conceive the idea of making a cement of high tensile strength, and to keep his product always of uniform quality. The problem he set for himself involved much labor, patient experiment, and the expenditure of considerable capital; but (to use his own words) by "determined effort and careful attention," he developed such a combination of the ingredients at his command, aided by improved appliances and a strict system of manufacturers' tests, as enabled him to give an article to the public that has made its own reputation.

In 1880 Mr. Norton read a paper before the Society, on "American Natural Cement," which showed a thorough knowledge of the subject, making him henceforth an authority on cement; his advice and experience being of great value to engineers, and, especially to the Committee of the Society, entrusted to formulate a system of uniform tests of cement, of which Committee he was a member.

Mr. Norton was a man of unflinching energy and unerring judgment in business affairs. Although for many years a great sufferer from physical troubles, he rarely missed a day from his business, all the details of which he managed and directed, although at great personal discomfort. He commanded the respect and confidence of all those with whom he was brought in contact, and was a delightful companion socially, possessing the happy faculty of retaining as fast friends those whose good fortune it was to become intimately acquainted with him. He, more than most men, believed in taking a broad and liberal view of men and things, thinking that the results of small and narrow methods are always repaid in kind. He spared not in giving the best that in him lay and of the means at his command, to the furtherance of that work to which his talents and inclinations led him.

The result has surely justified the means. He has left a name among the members of the Society and in the community at large which shall never want for a champion.

Mr. Norton was elected a Fellow of the American Society of Civil Engineers on June 4th, 1879, and always took an active interest in its affairs.

ROBERT C. MORRIS, M. Am. Soc. C. E.*

DIED NOVEMBER 8TH, 1892.

Robert Campbell Morris was born May 17th, 1817, in Jefferson County, Tenn., his father moving shortly afterwards to McKim County.

He was the only son of John Morris, an enterprising farmer and

* Memoir prepared by Hunter McDonald, M. Am. Soc. C. E.

merchant of East Tennessee, a descendant of Campbell Morris, one of the signers of the Declaration of Independence, and his ancestors were natives of Wales.

He graduated at the University of Tennessee, in Knoxville, in 1839. On leaving college, in obedience to his father's earnest wishes, but against his own inclinations, he connected himself with his father's business at Athens. Although entirely successful in this calling, he longed for a life better suited to his tastes. About this time the Hiwassee Railroad, the first chartered in the State, was organized and construction begun, under the direction of John C. Trautwine, Chief Engineer, with headquarters at Athens.

Young Morris embraced every opportunity of associating with this distinguished engineer and often joined him in his trips of reconnaissance and survey, always receiving kind instruction and useful advice. The project failed for want of funds, after which Mr. Morris gave up his store to accept the management of a lead mine near Charleston. On account of the failure of the ore, the company survived only two years. Upon his return to Athens, he found the Hiwassee Railroad reorganized under the name of the East Tennessee and Georgia Railroad, and he applied for and received the appointment of Assistant Engineer, in 1848.

He remained with this road under William G. Bonner and M. Lynch, Chief Engineers, until 1853, when he was elected Principal Assistant Engineer of the East Tennessee and Virginia Railroad, remaining until 1855. He was then elected Resident Engineer of the East Tennessee and Georgia Railroad, and while in this position built the road from Cleveland to Chattanooga. In 1860 he was elected Resident Engineer of the Nashville and Chattanooga Railroad Company, and remained with that road until driven into Georgia by the Federal troops.

In 1865 he was elected Resident Engineer of the combined East Tennessee and Georgia, and East Tennessee and Virginia, Railroads, with headquarters at Knoxville, and in 1866 Chief Engineer of the Knoxville and Charleston. This office he resigned in 1869 to accept that of Chief Engineer of the Nashville and Chattanooga Railroad Company, which position he filled with honor up to the time of his death, on November 8th, 1892.

He was elected a member of the American Society of Civil Engineers January 7th, 1874.

His first wife was Miss Henderson, of East Tennessee, who died in 1875, leaving an only daughter, Mrs. B. F. Wilson, of Nashville.

In 1884 he married Mrs. Rogers, of Cleveland, who nursed him in his last illness and still survives him.

He was one of the pioneers of railroad engineering in the South, and the handsome stone arches on the East Tennessee, Virginia and Georgia Railroad, and the excellent condition of the Nashville, Chatta-

nooga and St. Louis system, attest his skill and untiring devotion to his profession and the interests of his employers.

He was retiring and perhaps seclusive, desiring little attention from the outside world, and contenting himself with the thoughts of duty well done. He was ever equal to the perplexing emergencies which often confronted him, full of resource and energy, but, withal, careful, painstaking and cautious. His never-tiring zeal in the service of his company, his gentle firmness and extreme modesty, endeared him greatly to his associates and subordinates in the service.

He died at his home in Nashville, after an illness of one week of peritonitis, resulting from exposure while inspecting the bridge over Stone's River.

LIST OF MEMBERS.

ADDITIONS.

	MEMBERS.	Date of Membership.
GARFIAS, IGNACIO.....	Calle de los Gallos No. 11, Mexico, Mexico.....	Oct. 5, 1892
MARSHALL, WILLIAM LOUIS.....	Capt. Corps of Engineers, U. S. A., P. O. Drawer 132, Chicago, Ill.	June 1, 1892
NICHOLS, LEWIS ABEL.....	Engineer Dept., Northern Paci- fic R. R., St. Paul, Minn....	Oct. 5, 1892

ASSOCIATE MEMBER.

GROVER, ALVA JARVIS.....	City Engineer's Office, Omaha, Neb.....	Sept. 7, 1892
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JUNIORS.

CHESTER, JOHN NEEDELS.....	New Rochelle, N. Y.....	Dec. 6, 1892
HAYES, GEORGE SAMUEL.....	Berlin Iron Bridge Co., East East Berlin, Conn.....	Dec. 6, 1892

FELLOW.

EVEREST, CHARLES MARVIN.....	Rochester, N. Y.....	Nov. 1, 1892
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CHANGES AND CORRECTIONS.

MEMBERS.

DOANE, WALTER A.....	Norfolk and Western R. R., Ceredo, W. Va.
FIESER, L. F.....	31 Hamilton Ave., Columbus, Ohio.
FORNEY, M. N.....	501 Fifth Ave., New York City.

GOULD, WILLIAM T.....	Texas Central Ry., Waco, Texas.
GREENE, DAVID M.....	Consulting Engineer, 41 First St., Troy, N. Y.
GREENE, EDWARD A.....	114 S. Water St., Providence, R. I.
HAWKS, JAMES D.....	General Manager, Detroit Citizens' Street Ry., Detroit, Mich.
HENNY, DAVID C.....	(Care Excelsior Wooden Pipe Co.), 204 Front St., San Francisco, Cal.
HUDSON, JOHN R.....	108 Loomis St., Chicago, Ill.
JUENGST, HENRY F.....	(Care William Schroeder), 114 S. 8th St., St. Joseph, Mo.
KIELLAND, S. MUNCH.....	17 Cleveland St., Buffalo, N. Y.
LEDERLE, GEORGE A.....	P. O. Box 63, Alton, Ill.
LINDENTHAL, G.....	45 Cedar St., New York City.
LONG, THOMAS J.....	(Care Union Bridge Co.), Buffalo, N. Y.
MCDONALD, HUNTER.....	Chief Engineer, Nashville, Chattanooga and St. Louis Ry., Nashville, Tenn.
MORISON, GEORGE S.....	184 La Salle St., Chicago, Ill.
MORSS, FOSTER B.....	Chief Engineer E. C. L. & R. Co., Wilming- ton, N. C.
NICOLLS, WILLIAM J.....	President Irvona Coal Co., 119 S. Fourth St., Philadelphia, Pa.
PETRY, ALFRED.....	Burnside, Ky.
RISER, K. S.....	75 Loan and Trust Co. Bldg., Milwaukee, Wis.
SEDGWICK, THOMAS S.....	City Engineer, San Diego, Cal.
SMITH, MILLER A.....	224 Keap St., Brooklyn, N. Y.
TOMLINSON, SAM.....	Municipal Offices, Bombay, India.
TOMPKINS, JOHN A. B.....	Division Engineer, Great Northern Ry., Kalis- pell, Mont.
VAN AUKEN, ALVA M.....	Lemont, Ill.
WEINHAGEN, F.....	Engineer and Manager, Wisconsin Bridge and Iron Co., Milwaukee, Wis.
WILLARD, JAMES E.....	Portland, Ore.
WIMMER, SEBASTIEN.....	Saint Mary's, Elk Co., Pa.

ASSOCIATE MEMBERS.

CUNNINGHAM, A. C.....	Wayne, Delaware Co., Pa.
STOUT, EDMUND COFFIN.....	Engineer's Office, Scarborough-on-Hudson, N. Y.
THOMSON, T. KENNARD.....	Crane Dept., Yale and Towne Mfg. Co., Stam- ford, Conn.
VIELÉ, MAURICE A.....	Katonah, N. Y.
WILLARD, J. MILTON.....	Humboldt Park Office, Chicago, Ill.

JUNIORS.

FARGUSSON, MARK.....	(Care Walter Logan), 58 William St., New York City.
FERGUSON, WILLIAM L.....	1632 North 15th St., Philadelphia, Pa.

HOWE, HORACE J.....	Roadmaster, 3d and 4th Divisions, N. Y. P. and O. Ry., Galion, Ohio.
KHUEEN, R., Jr.....	313 Girard Bldg., Philadelphia, Pa.
LAWLOR, THOMAS F.....	Chief Engineer, Poughkeepsie and Wappinger's Falls Street Ry., Poughkeepsie, N.Y.
LELAND, GEORGE H.....	20 Market Square, Providence, R. I.
LOWINSON, OSCAR.....	Wauwatosa, Wis.
MOSES, JOHN C.....	(Care Boston Bridge Works), East Cambridge, Mass.
PHILLIPS, A. E.....	District Bldg., Washington, D. C.
SELBY, O. E.....	(Care Spanish-American Iron Co.), Santiago, Chili.
SHALER, IRA A.....	Ridgefield, N. J.
STAIR, WILLIAM H.....	334 Fulton St., Brooklyn, N. Y.
STANFORD, H. R.....	N. J. Steel and Iron Co., Trenton, N. J.
TAPPAN, ROGER.....	20 St. James Ave., Boston, Mass.
TYRRELL, HENRY G.....	373 West Main St., New Britain, Conn.
ZELLER, ALBERT H.....	26 Nicholson Place, St. Louis, Mo.

RESIGNATION.

ASSOCIATE.	Date of Resignation.
WOODWARD, C. M.....	Dec. 6, 1892

DEATHS.

DU BARRY, JOSEPH N.....	Elected Member, Jan. 6, 1875 ; died Dec. 17, 1892.
GOODWIN, HOMER STANLEY.....	Elected Member, July 20, 1870 ; died Dec. 25, 1892.

DROPPED.

MEMBERS.	Date of Action of the Board.
BLICKENSDEKFER, ROBERT.....	Dec. 6, 1892
JACKSON, CHARLES E.....	Dec. 6, 1892
POTT, JOHN N.....	Dec. 6, 1892
SURTEES, ROBERT.....	Dec. 6, 1892

JUNIORS.

JOHNSON, SINCLAIR J.....	Dec. 6, 1892
SANFORD, DAVID C.....	Dec. 6, 1892
WHEATLEY, JOHN Y.....	Dec. 6, 1892

ADDITIONS TO LIBRARY AND MUSEUM.

- From American Water Works Association:
Report of Proceedings of the Twelfth Annual Meeting, May 17th-20th, 1892.
- From Atchison, Topeka and Santa Fé R. R.:
Twentieth Annual Report of the Board of Directors for the fiscal year ending June 30th, 1892.
- From W. A. Allen, Portland, Me.:
Thirty-first Annual Report of the Maine Central Railroad Company for the year ending September 30th, 1892.
- From Board of Trustees of the Sanitary District of Chicago:
Proceedings, November 23th-30th, 1892.
- From A. Bouisson, Paris, France:
Note sur l'Installation des Appareils Hydrauliques de la Nouvelle Gare de Paris, St. Lazare.
- From George Bowers, Lowell, Mass.:
Communication of Water Board to Lowell City Council, asking for an appropriation of money for a supplementary water plant.
Nineteenth Annual Report of the Lowell Water Board, 1891.
- From Cesare Cipolletti, Mendoza, Argentine Republic:
Canale Villoresi, Modulo per la Dispensa delle Acque Stramazzo Libero di Forma Trapezia a coefficiente di Contrazione Costante.
- From Cornell University, Ithaca, N. Y.:
Bulletins Nos. 45 and 46, October and November, 1892, of the Agricultural Experiment Station.
- From Dyckerhoff & Sons, Amöneburg, Germany:
Der Portland Cement und seine Anwendungen im Bauwesen.
- From Harvard University:
The Harvard University Catalogue, 1892-93.
- From Harbours and Rivers Department, Brisbane, Australia:
Report from the Engineer for Harbours and Rivers for the year ending June 30th, 1892.
- From Robert M. Haseltine, Columbus, Ohio:
Seventeenth Annual Report of the Chief Inspector of Mines to the Governor of the State of Ohio for the year 1891.
- From Institution of Civil Engineers, London, Eng.:
Measurement of the Velocity of Air in Pipes.
Waterloo New Signal Station.
Address of the President, November 8th, 1892.
Zurich Water Supply, Power and Electric Works.
- From J. P. Lesley, Philadelphia, Pa.:
Pennsylvania Geological Survey; Summary, Final Report, Vol. II, 1892.
- From Gabriel Leverich, Brooklyn, N. Y.:
Report of the Trustees of the New York and Brooklyn Bridge for the year ending December 1st, 1892.
- From Stuart Murray, Melbourne, Australia.
Report to the Minister of Water Supply on "Water Supply to the Mallee."
- From J. A. Ockerson, St. Louis, Mo.:
The Mississippi River from St. Louis to the Sea.
- From Ohio Society of Surveyors and Civil Engineers:
Thirteenth Annual Report, being the Transactions of the Thirteenth Annual Meeting, January, 1892.
- From Ernest Pontzen, Paris, France.
Association Amicale des Ingenieurs Anciens Elèves de l'Ecole des Ponts et Chaussées en France. Bulletin No. 10, November, 1891.
- From State Board of Health, Boston, Mass.:
Twenty-third Annual Report for 1891.
- From U. S. Bureau of Education:
Rise and Growth of the Normal School Idea in the United States.
Biological Teaching in the Colleges of the United States.
Southern Women in the recent Educational Movement in the South.
Promotions and Examinations in Graded Schools.
- From U. S. Coast and Geodetic Survey:
Bulletin No. 25. Observations at Rockville, Md., for the Variations of Latitude in Co-operation with the International Geodetic Association.
- From U. S. Department of Agriculture:
Observations and Experiments on the Fluctuations in the Level and Rate of Movement of Ground Water on the Wisconsin Agricultural Experiment Station Farm, and at Whitewater, Wis.
- From U. S. Navy Department, Chief Intelligence Officer:
General Information Series, No. XI, July, 1892.
Report of the Chief of the Bureau of Medicine and Surgery, 1892.
- From U. S. Department of State:
Reports from the Consuls of the U. S., October, 1892.
- From U. S. Post Office Department:
Annual Report of the Postmaster-General for the fiscal year ending June 30th, 1892.

From U. S. War Department, Chief of Engineers:

Fifty-two Reports of the Examination of certain Rivers and Harbors.

Twenty-eight specifications for the Improvement of certain Rivers and Harbors.

From Robert Van Buren, Brooklyn, N. Y.:

Annual Report of the Department of City Works for the year 1891, made to the Common Council of the City of Brooklyn, February 1, 1892.

From Victorian Institute of Surveyors:

Transactions and Proceedings, Vol. III, 1885-91.

From George A. Wetherbee, Malden, Mass.:
Report of the Chief Engineer to the Board of Street Commissioners on a Sewerage System for the City of Malden, Mass., 1892.

From H. M. Wilson, Washington, D. C.:

Extra Census Bulletin No. 23. Agriculture Irrigation.

From C. J. H. Woodbury, Boston, Mass.:

The Saugus Iron Works at Lynn, Mass.

AMERICAN SOCIETY
OF
CIVIL ENGINEERS.

INSTITUTED NOVEMBER 5, 1852.

CONSTITUTION, AND LIST OF
MEMBERS.

OCTOBER, 1892.

HOUSE OF THE SOCIETY, 127 EAST TWENTY-THIRD STREET,
NEW YORK.

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American Society of Civil Engineers.

CONSTITUTION.

ADOPTED MARCH 4TH, 1891.

ARTICLE I.—NAME, LOCATION AND OBJECT.

1.—The name of this Association shall be the AMERICAN SOCIETY OF CIVIL ENGINEERS.

2.—The offices of the Society shall be located in the City of New York.

3.—Its objects shall be the advancement of engineering knowledge and practice and the maintenance of a high professional standard among its members.

4.—Among the means to be employed for this purpose shall be: meetings for the presentation and discussion of appropriate papers and for social and professional intercourse; the publication of such papers and discussions as may be deemed expedient; the maintenance of a library, the collection of maps, drawings and models, and the establishment of facilities for their use.

ARTICLE II.—MEMBERSHIP.

1.—The Corporate Members of this Society shall be designated as Members and Associate Members. There may also be connected with the Society, Honorary Members, Associates, Juniors, Fellows and Subscribers, who shall be entitled to all the privileges of the Society, except the right to vote and to hold office therein; provided that Honorary Members elected from the Corporate Members of the Society shall retain their right to vote and to hold office.

2.—A Member shall be a Civil, Military, Naval, Mining, Mechanical, Electrical, or other professional Engineer, an Architect or a Marine Architect. He shall be at the time of admission to membership not less than thirty years of age, and shall have been in the active practice of his profession for ten years; he shall have had responsible charge of work for at least five years, and shall be qualified to design as well as to direct engineering works. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice. The performance of the duties of a Professor of Engineering in a technical school of a high grade, shall be taken as an equivalent to an equal number of years of actual practice.

3.—An Associate Member shall be a professional Engineer or Architect not less than twenty-five years of age, who shall have been in the active practice of his profession for at least six years, and who shall have had responsible charge of work as principal or assistant for at least one year. Graduation from a school of engineering of recognized reputation shall be considered as equivalent to two years' active practice.

4.—Any person having the necessary qualifications prescribed in this article to entitle him to admission to the grades of Member or Associate Member, shall be eligible for such membership, though he may not be practicing his profession at the time of making his application.

5.—An Associate shall be a person who, by scientific acquirements or practical experience, has attained a position in his special pursuit qualifying him to co-operate with engineers in the advancement of professional knowledge and practice, but who is not a professional engineer.

6.—A Junior shall be not less than eighteen years of age, and his connection with the Society shall cease when he becomes thirty years of age, unless he be previously transferred to another grade. He shall have had active practice in some branch of engineering for at least two years, or he shall have graduated from a school of engineering of recognized standing. He shall state in his application for membership that he intends to become or to continue to be an engineer. Persons who are in the Junior class at the time of the adoption of this Constitution shall not have their status changed by the provisions of this section.

7.—Honorary Members shall be chosen only from persons of acknowledged eminence in some branch of engineering or the sciences related thereto. There shall not be more than twenty at any one time.

8.—Fellows shall be contributors to the permanent funds of the Society, who may not be eligible for admission as Corporate Members.

9.—There may also be admitted to association with the Society as Subscribers, persons not less than twenty-one years of age who are not eligible for admission to any grade of membership otherwise provided for.

ARTICLE III.—ADMISSIONS AND EXPULSIONS.

1.—Honorary Members shall be proposed by at least ten Members, and shall be elected by a unanimous vote of the Board of Direction and such Past Presidents of the Society as shall be at the time Members and resident in North America. A Past President, or a member of the Board of Direction proposed for Honorary Membership, shall not be required to vote either for or against his own admission.

A person elected an Honorary Member shall be promptly notified thereof by letter. The election shall be canceled if an acceptance is not received within six months after the mailing of such notice.

2.—An application for admission to the Society as Member or as Associate Member, or for transfer from the lower to the higher grade, or for transfer from any other grade to either grade of Corporate Membership, shall embody a concise statement, with dates, of the candidate's professional training and experience; and shall be in a form and in such detail

as may be prescribed by the Board of Direction. It shall be signed by the applicant, and shall contain a promise to conform to the requirements of membership, if elected. The applicant shall give at least five references, who shall be Corporate Members in good standing, who shall each be requested by the Secretary to sign and forward a letter to the Board of Direction stating the extent of his knowledge of the applicant and of his qualifications, certifying that he knows the applicant personally and believes him to be in all respects a proper person to be admitted into the Society.

Applications of engineers not resident in North America, and who may be so situated as not to be personally known to five Corporate Members, may be recommended for ballot by members of the Board of Direction, after having secured evidence sufficient, in their opinion, to show that the applicant is worthy of admission.

3.—At stated periods, to be determined by the Board of Direction, there shall be issued to each member in any grade whose address is known, a list of all new applications received for membership in any grade or for transfer from one grade to another, which list shall be dated and shall contain a concise statement of the record of each applicant and the names of the references or endorsers, with a request that members transmit to the Board any information in their possession which may affect the disposition of the applications. Not less than twenty days after the issue of such list, the Board of Direction shall consider these applications, together with any information in regard to the applicants that may have been received; may make further inquiries, if deemed expedient; may classify the applicant with his consent, and on applications for Corporate Membership may direct a ballot.

4.—The ballots shall be letter-ballots, in a form to be prescribed by the Board of Direction. They shall be mailed to each Corporate Member whose address is known, and shall state the date on which the ballot is to be canvassed, which shall be not less than twenty days after the issue of the ballot. Seven or more negative votes shall exclude from election. In case of exclusion no notice thereof shall be entered on the minutes, but the candidate shall be notified.

5.—The Board of Direction, upon receipt of letters from not less than eight Corporate Members in good standing, requesting a reconsideration of the ballot on any excluded candidate and stating the reasons for such request, shall consider these reasons, and if the Board deems them sufficient, it shall cause a notice to be mailed to each Corporate Member whose address is known, giving the name and record of the applicant, and the names of those who ask a reconsideration. This notice shall include a request that any member having information which might aid in a proper consideration of the application, will at once transmit such information to the Board of Direction.

Not less than twenty days after the issue of this notice, the Board shall again consider the request with any additional information that may have been received, and it may continue the inquiry so as to secure the fullest information. If the Board decides that the reasons for a reconsideration are sufficient, it shall order another ballot to be taken. A letter-ballot in a form to be prescribed by the Board shall then be mailed to each Corporate Member whose address is known; and the vote thereon shall be canvassed at a meeting

held not less than twenty days after its issue. Negative ballots to the number of 10 per cent. of the votes cast shall exclude.

The request for reconsideration of a ballot must be presented within one year after the date of the original canvass of such ballot.

6.—An application for admission as Associate, Junior, Fellow, or Subscriber, shall be in a form to be prescribed by the Board of Direction; shall embody a statement of the applicant's qualifications for the grade of membership to which admission is sought and a promise to conform to its requirements. The application shall be signed by the applicant, and it shall be indorsed by at least three Corporate Members, who shall certify that they personally know the applicant, that they believe him to be in all respects a proper person to be admitted to the Society, and that they recommend him for admission.

7.—The Board of Direction, after making such inquiries as it may deem expedient, shall have the power to elect persons so proposed, as Associates, Juniors, Fellows, or Subscribers; and shall notify the membership of its action.

8.—All elected candidates shall be duly notified and shall subscribe to the Constitution and Rules of the Society. Forms for these purposes shall be prescribed by the Board of Direction. If these provisions are not complied with within six months from the notification of election, such election shall be considered void, unless for special reason the time shall be extended by the Board of Direction.

Membership of any person shall date from the day of his election.

9.—Upon the written request of ten or more Corporate Members, that for cause therein set forth, a person belonging to the Society be expelled, the Board of Direction shall consider the matter, and if there appears to be sufficient reason, shall advise the accused of the charges against him. He may, if he so desires, present a written defense which shall be considered at a meeting of the Board of Direction, of which he shall receive due notice. Not less than two months after such meeting, the Board of Direction shall finally consider the case, and if resignation has not been tendered, or a defense made which is satisfactory to the Board, it shall then notify the person that he will be expelled in one month, unless he elects to appeal from this decision. Appeals will be submitted to the Corporate Members by letter-ballot in a form to be proscribed by the Board of Direction. The ballot shall be accompanied by a statement of the charges, and of the action of the Board thereon, with such information as it deems proper, and also the statement of the person making the appeal. The ballot shall be canvassed by the Board not less than twenty days after its issue. A majority of the ballots cast will be required to sustain the action of the Board. The Board will notify the person and the Corporate Members of the result of the ballot. In case no appeal be made, the Board of Direction will expel the person, and notify him and the Corporate Members of its action.

10.—A member of any grade in the Society may resign his membership by a written communication to the Secretary, who shall present the same to the Board of Direction; when, if all his dues have been paid, his resignation shall be accepted.

11.—All persons elected and duly qualified, whose address on the records of the Society is within fifty miles of the Post Office in the City of New

York, shall be deemed Resident; and those whose address is beyond that limit shall be deemed Non-Resident.

The classification of each person for the fiscal year as Resident or Non-Resident, shall be determined by the Records of the Society as they may appear on January 1st of that year.

ARTICLE IV.—DUES.

1.—The entrance fees payable on admission to the Society shall be as follows: by Members, thirty dollars; Associate Members, twenty-five dollars; Associates, twenty dollars; Juniors, ten dollars; Subscribers, ten dollars.

2.—The annual dues payable by members, whether Resident or Non-Resident, shall be as follows: by Corporate Members, fifteen dollars; Associates, ten dollars; Juniors, ten dollars; and Subscribers, ten dollars.

3.—In addition to the dues prescribed in the preceding section, each resident member shall pay annually as follows: Corporate Members, ten dollars; Associates, Juniors and Subscribers, five dollars.

4.—A person transferred from any grade to a higher one shall pay the difference between the entrance fees of the two grades, and his annual dues shall be those of the higher grade.

5.—The annual contributions shall become due for the ensuing year on the first day of January, and shall be payable in advance. It shall be the duty of the Secretary to notify each Member of the amount due for the ensuing year at the time of giving notice of the Annual Meeting.

6.—Persons elected after six months of any fiscal year shall have expired, shall pay only one-half of the amount of dues for that fiscal year.

7.—All future annual dues may be compounded by a single payment by a Corporate Member of \$250; or by an Associate or Subscriber of \$150. Should a compounding Associate or Subscriber be elected to Corporate Membership he shall pay the further sum of \$100.

Provided, That all compounding Corporate Members, Associates or Subscribers who may be or hereafter become Resident, shall be and remain liable for the annual payment of the difference between the annual dues of Resident and Non-Resident Corporate Members, Associates or Subscribers; but any Corporate Member may at any time compound for the future payment of all annual dues of every nature and kind by the payment of \$75 in addition to the \$250 hereinbefore named; and any Associate or Subscriber may at any time compound for the future payment of all annual dues as Associate or Subscriber by the payment of \$40 in addition to the \$150 hereinbefore named.

Provided, that any person desiring to compound for future dues shall have paid his entrance fee, all arrears of dues, and the annual dues for the current year, before the compounding sum may be available.

Persons compounding shall sign an agreement that they will be governed by the Constitution and Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be connected with the Society from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

All moneys thus paid in commutation of annual dues shall be invested as a permanent fund, only the interest thereupon being subject to appropriation for current expenses.

8.—Any person whose dues are more than three months in arrears shall be notified by the Secretary. Should his dues not be paid when they become six months in arrears he shall lose the right to vote or to receive the publications of the Society. Should his dues become nine months in arrears, he shall again be notified in form prescribed by the Board of Direction, and if such dues become one year in arrears, he shall forfeit his connection with the Society. The Board of Direction, however, may, for cause deemed by it sufficient, extend the time for payment and for the application of these penalties.

9.—The Board of Direction may, for sufficient cause, temporarily excuse from payment of annual dues any member who from ill-health, advanced age, or other good reason assigned, is unable to pay such dues; and the Board may remit the whole or part of dues in arrears, or accept, in lieu thereof, desirable additions to the Library, or collections.

10.—Every person admitted to the Society shall be considered as belonging thereto and liable for the payment of all dues until he shall have resigned, been expelled, or have been relieved therefrom by the Board of Direction.

11.—Persons elected as Fellows shall become such upon the payment of Two Hundred and Fifty dollars into the permanent funds of the Society. They shall not be liable for other fees and dues.

12.—The status of any present subscribers shall not be changed by the provisions of this Constitution.

ARTICLE V.—OFFICERS.

1.—The Officers of the Society shall be: a President, four Vice-Presidents, eighteen Directors, a Secretary, and a Treasurer; who, with all living Past Presidents of the Society who continue to be Members, shall constitute the Board of Direction, in which the government of the Society shall be vested, and who shall be the Trustees as provided for by the laws under which the Society is organized.

2.—The terms of office of the President, Secretary and Treasurer shall be one year; of the Vice-Presidents, two years; and of the Directors, three years. Provided, however, that at the first election after the adoption of this Constitution, four Vice-Presidents and eighteen Directors shall be elected, of whom two Vice-Presidents and six Directors shall be elected to serve for one year only, and six Directors for two years only; provided, also, that after the first election two Vice-Presidents and six Directors shall be elected each year.

The term of each officer shall begin at the close of the Annual Meeting at which such officer is elected, and shall continue for the period above named or until a successor is duly elected.

3.—A vacancy in the office of President shall be filled by the senior Vice-President.

A vacancy in the office of Vice-President shall be filled by the senior Director. Seniority between persons holding similar offices shall be determined by priority of election to the office; and when these dates are the same, by priority of admission to Corporate Membership; and when the latter

dates are identical, the selection shall be made by lot. In case of the disability or neglect in the performance of his duty, of any officer, of this Society, the Board of Direction shall have power to declare the office vacant. Vacancies in any office for the unexpired term shall be filled by the Board of Direction, except as provided above.

4.—The President shall be ineligible for re-election. The Vice-Presidents and Directors shall not be eligible for re-election to the same office, until at least one full term shall have elapsed after the end of their respective terms.

5.—At least one Vice-President, the Secretary and the Treasurer, and six Directors shall be Resident Corporate Members during their term of office.

ARTICLE VI.—MANAGEMENT.

1.—The President shall have a general supervision of the affairs of the Society. He shall preside at meetings of the Society and of the Board of Direction at which he may be present, and shall be *ex-officio* member of all committees. He shall deliver an address at the Annual Convention.

The Vice-Presidents in order of seniority shall preside at meetings in the absence of the President, and discharge his duties in case of a vacancy in the office.

2.—The Board of Direction shall manage the affairs of the Society in conformity to the laws under which the Society is organized and the provisions of this Constitution. It shall direct the investment and care of the funds of the Society; make appropriations for specific purposes; act upon applications for membership as heretofore provided; take measures to advance the interests of the Society; appoint all its employees; and generally direct its business. The Board of Direction shall make an annual report at the Annual Meeting, transmitting the report of the Treasurer and of other officers, and of Committees.

3.—The Treasurer shall receive all moneys and deposit the same in the name of the Society. He shall invest all funds not needed for current disbursements, as shall be ordered by the Board of Direction. He shall pay all bills, when certified and audited, as provided by this Constitution and by rules to be prescribed by the Board of Direction. He shall make an annual report and such other reports as may be prescribed by the Board of Direction. The accounts and financial books of the Society shall be examined annually by an expert accountant, to be selected by the Board of Direction.

The Board of Direction shall secure a satisfactory surety for the faithful performance of his duties by the Treasurer, and shall renew the same during the month of January of each year.

4.—The Secretary shall be, under the direction of the President and Board of Direction, the executive officer of the Society.

He will be expected to attend all meetings of the Society and of the Board of Direction; prepare the business therefor, and duly record the proceedings thereof.

He shall see that all moneys due the Society are carefully collected, and without loss transferred to the custody of the Treasurer.

He shall carefully scrutinize all expenditures, and use his best endeavor to secure economy in the administration of the Society.

He shall personally certify the accuracy of all bills or vouchers on which money is to be paid, and shall countersign the checks drawn by the Treasurer against the funds of the Society, when such drafts are known to him to be proper and duly authorized by the Board of Direction.

He shall conduct the correspondence of the Society and keep full records of the same.

He shall have charge of the Society's house and its contents; shall supervise the work of all employees of the Society, and see that they diligently perform their respective duties.

He shall perform all other duties which may from time to time be assigned to him by the Board of Direction.

5.—An Assistant Secretary, who shall also be Librarian, shall be appointed by the Board of Direction and shall aid the Secretary and be under his immediate direction in all matters. His whole time shall be given to the Society.

6.—An auditor shall also be appointed by the Board of Direction, who shall have entire charge of the books of account of the Society, and shall furnish monthly to the Board of Direction a statement of receipts and expenses under their several headings, and also a statement of monthly balances.

He shall present annually to the Board of Direction a balance sheet of his books, as of the 31st of December, and shall furnish from time to time such other statements as may be required of him.

7.—The Secretary and Treasurer shall be paid salaries to be determined by the Board of Direction; but such salaries shall not be reduced during the term of office, as provided in this Constitution. All other salaries shall be fixed, from time to time, by the Board of Direction.

8.—The Board of Direction shall meet within twenty days after the Annual Meeting, and shall then appoint from its members a Finance Committee of five, a Library Committee of five, and a Committee on Publications of five. At least three members of the Finance Committee, and two members of the other Committees, shall be resident within fifty miles of New York.

These Committees shall report to the Board of Direction, and perform their duties under its supervision.

9.—The Finance Committee shall have immediate supervision of the accounts and financial affairs of the Society, shall approve all bills before payment, and shall make recommendations to the Board of Direction as to the investment of moneys and as to other financial matters.

10.—The Library Committee shall have general supervision of the Library and the House of the Society and the property therein; shall make recommendations to the Board with reference thereto, and shall direct the expenditure for books and other articles of permanent value, of such sums as may be appropriated for these purposes.

11.—The Committee on Publications shall have general supervision of the publications of the Society, and of contracts and expenditures connected therewith.

12.—In the consideration of papers offered for presentation, those papers containing matter readily found elsewhere, those specially advocating personal interests, those carelessly prepared or controverting established facts, and those purely speculative or foreign to the purposes of the Society, shall be

rejected. The Committee on Publications shall determine which papers shall be read in full, and which shall be printed after reading by title only. The Committee may return a paper to the writer for correction and emendation, and call to its aid one or more members of special experience relating to the subject treated, either to advise on the paper or to discuss it. Such papers as in the judgment of the Committee should appear in the *Transactions*, shall promptly, upon their acceptance, be printed and distributed to Members of all grades; others shall, with the consent of the authors, be suitably indexed and filed for reference, or the Committee may provide abstracts thereof, which, when approved by the authors, may be published instead of the original papers. Advance copies of papers and discussions may be sent out to the membership before final publication.

13.—Special committees to report upon engineering subjects shall be authorized only by a majority of the votes cast by the Society, and in the following manner: A proposition to appoint such a Committee shall be presented at a regular meeting of the Society, and if sustained, on a motion to refer the same to the Board of Direction, by an affirmative vote of not less than twenty-five Corporate Members, it shall be so referred.

The Board of Direction shall then consider the same and report its recommendations to the Society at the next general business meeting, together with a statement of the arguments for and against the appointment of such Committee.

If a motion for the issue of a letter-ballot thereon receive the affirmative vote of two-thirds of the Corporate Members present, the Board of Direction shall, within thirty days thereafter, issue the letter-ballot, accompanied by a statement of the arguments for and against the proposition.

A majority of a total vote of not less than one-third of the Corporate Membership of the Society shall be necessary for its adoption, whereupon the Committee so authorized shall be appointed by the Board of Direction.

ARTICLE VII.—NOMINATION AND ELECTION OF OFFICERS.

1.—At the Business Meeting of the Annual Convention, seven Corporate Members, not officers of the Society, shall be appointed by the meeting, who, with the five last living Past Presidents of the Society, shall be the Nominating Committee. This Committee shall present to the Board of Direction, on or before the first day of October ensuing, a list of nominations for the offices to be filled at the next Annual Election. These nominations shall be so made, as to provide, with the officers holding over, a Resident Vice-President and six Resident Directors.

Directly after the first of October this list shall be mailed to all Corporate Members of the Society; provided that if any person shall be found by the Board of Direction to be ineligible for the office for which he is nominated, or should a nominee decline such nomination, his name shall not be sent out, but the Board of Direction shall substitute another name therefor.

At any time previous to the first day of December any ten or more Corporate Members may send to the Secretary additional nominations, signed by such Members.

Should the nominations made not include a sufficient number of Resident Members to comply with the requirements of this Section, the Board of Direction shall add names of Resident Members sufficient to comply therewith.

At least thirty days previous to the Annual Meeting there shall be mailed to every Corporate Member whose address is known, a letter-ballot with envelopes for voting. This ballot shall include all the nominations made in accordance with this article. The names and residences of nominees and their grades of membership shall be given ; all the names for any one office being arranged alphabetically, and without distinguishing marks of any kind, except that the names of Residents and Non-Residents shall be in separate groups and shall be so designated.

Members voting may erase names from the printed ballot-list, and may substitute the name or names of any other person or persons eligible for any office. But the number of names for each office on the ballot voted must not exceed the number to be elected at that time to such office, and the vote must be for the proper number of Resident and Non-Resident officers. Ballots not in accordance with these provisions must be rejected.

Directions in accordance with these provisions shall be issued with the ballots.

2.—Ballots may be sent by mail to the Secretary, or may be presented to him at the Society House. They may be enclosed in two sealed envelopes. The outer envelope shall be endorsed by the voter's signature.

The Secretary shall make from the endorsements on the outer envelopes a list of the voters from whom ballots are received, which list shall be open to inspection by all Corporate Members. A voter may change his vote by written request.

3.—The poll shall be closed at 12 o'clock noon on the first day of the Annual Meeting, and the ballots shall be canvassed publicly by tellers appointed by the presiding officer.

The persons voted for, for each office, Resident and Non-Resident, to the number of each class to be elected, who shall receive the highest number of votes, shall be declared elected.

In case of a tie between two or more candidates for the same office, the Annual Meeting shall elect the officer from among the candidates so tied.

The presiding officer shall announce to the meeting the names of the officers elected in accordance with this section.

ARTICLE VIII.—MEETINGS.

1.—A Convention of the Society for the reading and discussion of professional papers and for social intercourse shall be held annually at such time and place as the Society may determine.

2.—There shall be two general Business Meetings of the Society each year : the Annual Meeting, which shall be held at the offices of the Society on the third Wednesday in January, and at which the annual reports for the year ending December 31st previous shall be presented, and the ballot for officers canvassed ; and a Business Meeting during the Annual Convention, which shall be held at a time and place to be determined by the Board of Direction.

At these meetings thirty Corporate Members shall constitute a quorum.

3.—Business Meetings shall be held monthly on the first Wednesday of each month, except during the months of July and August. At these meetings thirty Corporate Members shall constitute a quorum.

4.—In addition to the Annual Meeting and the Annual Convention, meetings for the reading and discussion of papers shall be held as ordered by the Board of Direction.

5.—Special Meetings may be called by the Board of Direction, and shall be so called on the request of thirty Corporate Members, which request shall state the purpose of such meeting. The call for such meetings shall be issued ten days in advance, and shall state the purpose thereof, and no other business shall be taken up at such meeting. At these meetings thirty Corporate Members shall constitute a quorum.

6.—The Society may adopt, from time to time, rules for the order of business at its meetings.

7.—Meetings of the Board of Direction shall be held at the time of the Annual Meeting and of the Annual Convention, at which meeting nine Members shall constitute a quorum; and at such other times as the Board may determine, at which five Members shall constitute a quorum.

ARTICLE IX.—AMENDMENTS.

1.—Proposed amendments to this Constitution must be reduced to writing and signed by not less than five Corporate Members, and be submitted and acted upon as follows:

2.—Amendments presented to the Secretary on or before the first Wednesday in November shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Meeting. Such amendments shall be in order for discussion at such Annual Meeting, and may be amended in any manner pertinent to the original amendments by a majority vote of the Annual Meeting, and if so amended shall be voted upon by letter-ballot in form as amended by the Annual Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in March.

3.—Amendments presented to the Secretary not less than sixty days previous to the date of the Annual Convention, shall be sent by letter to the several Corporate Members of the Society at least twenty-five days previous to the Annual Convention. Said amendments shall be in order for discussion at the Business Meeting during such Annual Convention, and may be amended in any manner pertinent to the original amendments by a majority vote of the Business Meeting during the Annual Convention, and, if so amended, shall be voted upon by letter-ballot in form as amended by said Business Meeting; if not so amended, they shall be voted upon by letter-ballot as submitted. The vote to be counted at the first regular meeting in October.

4.—If, after discussion of a proposed amendment, at either of the general meetings of the Society, the meeting shall so decide by a majority vote, it may refer the amendment to a Committee for further consideration, which Committee shall report at the next general meeting, whereupon the amendment shall be voted upon as hereinbefore provided.

5.—An affirmative vote of two-thirds of all ballots cast shall be necessary to the adoption of any amendment.

Amendments so adopted shall take effect thirty days after their adoption, provided that the officers of the Society, at the time any amendment may be adopted, shall continue in office until the next Annual Election.

FORMS REQUIRED BY THE CONSTITUTION.

[FORM No. 1.]

FORM OF APPLICATION.

An Application for Membership in any grade, or for transfer from a lower to a higher grade, shall contain a statement, over the *candidate's signature*, of his *age, residence*, the nature and term of his *professional service*, and that he will conform to the requirements of membership if elected.

STATEMENT.

I [*Full Christian names and surname of candidate*] residing at [*City or town, county, state*] being desirous of admission into the American Society of Civil Engineers as [*State class of membership*] submit the following as my professional record:

I was born at [*Place of birth*] on [*Date of birth*] 18 , [*This must embody for all classes of members,* except Fellows, a concise narrative, with dates, of the candidate's professional career, specifying the positions he has held, the nature and extent of the works in or upon which he has been engaged, giving an idea of their magnitude and importance. All proper names, names of railroads, etc., must be written without abbreviation.*]

[*Finally state present professional engagement or occupation.*]

FOR MEMBER, ASSOCIATE MEMBER, JUNIOR, ASSOCIATE OR FELLOW.

I will conform to the requirements of membership, if elected as [*State class of membership*].

[*The applicant will sign here his regular signature, and give his present post-office address.*]

Dated..... 18

(A.) In case the Application be for Corporate Membership, fill out the following:

I hereby give as references to my standing as a man and an engineer the following gentlemen:

[*Give the names and full address of at least five Corporate Members.*]

(B.) If the Application be for the grade of Associate, Junior or Fellow, have the following filled out:

On the grounds stated, and because we believe him from personal knowledge to be in all respects a proper person to be admitted into the American Society of Civil Engineers, we hereby recommend [*Full name of candidate*] of [*Residence of candidate*] for election as [*Class of membership*].

[*To be signed by at least three Corporate Members of the Society, personally acquainted with the applicant.*]

[Blank forms are furnished on application to the Secretary.]

* Applications for Fellowship shall contain a brief statement of the applicant's age, business career and reputation, signed by three proposers and the applicant.

[FORM No. 2.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

Mr.....having made application for admission as.....in the American Society of Civil Engineers, refers to you for information as to his character and professional career, and his reputation as an engineer. Will you kindly transmit to the Board of Direction, in writing, any information you may have as to the character and professional career of the applicant, his reputation as an engineer and a gentleman, the character of work of which he has had charge, and the duration of such charge, with any facts which will aid in the final consideration of the application. If you are willing to become his endorser, it is necessary that you shall sign and forward to the Board of Direction a letter, stating the extent of your knowledge of the applicant and of his qualifications, and certifying that you know him personally and believe him to be in all respects a proper person to be admitted into the Society.

The application will probably be considered by the Board on.....

Yours very truly,

.....Secretary.

Form No. 3 is the preliminary notice or blue list to be issued (in advance of the ballot list) to all members.

[FORM No. 4.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

The Board of Direction, having examined the record given by Mr.in an application for admission to this Society as.....desires more exact information respecting his character and professional career, his reputation as an engineer and a gentleman, the nature and extent of the works upon which he has been engaged, and to what extent he has had charge of such work, together with the duration of such charge.

I am requested by the Board to write you for such further information as you can give, to aid it in arriving at a proper decision on the application.

Yours truly,

.....Secretary.

[FORM No. 5.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

The Board of Direction having considered your application for admission to this Society, reports from the information contained in the statement of professional services submitted, that under the Constitution you are eligible as....., and if this classification is accepted by you a ballot will be ordered.

Please express upon the annexed blank your consent, or give reasons why the application should be reconsidered.

Respectfully,

.....Secretary.

IF CLASSIFICATION IS ACCEPTED, SIGN THIS FORM.

I accept the classification of.....
and, if elected, will conform to the requirements of membership.

Respectfully,

.....Applicant.

.....
Place. Date.

IF CLASSIFICATION IS NOT ACCEPTED, FILL OUT AND SIGN FORM.

I ask that the above classification be reconsidered for the following reasons:

[Here state reasons.]

.....Applicant.

.....
Place. Date.

Form No. 6 is the ballot list to be issued to all Corporate Members only.

[FORM NO. 7.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

I have the pleasure to inform you that on the.....day of
.....you were elected a.....
of the American Society of Civil Engineers.

To confirm this election, it is necessary, under Article III, Section 8 of the Constitution, for you to subscribe the enclosed obligation, and to pay to the Society the prescribed fee as stated in the enclosed bill.

Respectfully,

.....Secretary.

[FORM NO. 8.]

I, the undersigned, having been duly elected a.....
of THE AMERICAN SOCIETY OF CIVIL ENGINEERS, do hereby promise that I will be governed by its Constitution, as it now exists, or as it may be amended, and that I will aid the objects of the said Society by *furnishing papers and discussions*, and attending the meetings thereof as often as I conveniently can; provided that whenever I shall signify in writing to the Secretary that I am desirous of withdrawing therefrom, I shall (after the discharge of my indebtedness to the Society), be free from this obligation.

Witness my hand, this.....day of.....18

.....

[FORM NO. 9.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

Under the provisions of the Constitution, it becomes my duty as Secretary of the American Society of Civil Engineers, to notify you that by the ballot on your application for.....canvassed.....you failed of election to the Society.

Yours truly,

.....Secretary.

[FORM NO. 10.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

Under the provisions of the Constitution, it becomes my duty as Secretary of the American Society of Civil Engineers, to notify you that at a meeting of the Board of Direction, held....., a ballot was taken on your application for.....and you failed of election to the Society.

Yours truly,

.....Secretary.

[FORM NO. 11.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

Notice is hereby given that in accordance with Article III, Section 5 of the Constitution, a reconsideration of the ballot on.....has been asked for by eight Corporate Members in good standing, stating the reason for such request; and that the Board of Direction has considered these reasons, and deem them sufficient to demand further investigation. The name and record of the applicant are sent herewith, and you are requested to transmit at once to the Board any information you may have as to the character and professional career of the applicant, his reputation as an engineer and gentleman, the character of work of which he has had charge, with any other facts which will aid it in a proper consideration of this application.

The Board will take final action.....18

.....Secretary.

[FORM No. 12.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

The Board of Direction of the American Society of Civil Engineers has instructed me to inform you that you have been in arrears since.....
Your present indebtedness is \$....., and your attention is called to the provisions of the Constitution quoted below.*

Respectfully,

..... Secretary.

[FORM No. 13.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR:

The Board of Direction of the American Society of Civil Engineers has instructed me to inform you that you have been in arrears since.....
Your present indebtedness is \$, and by the provisions of Article IV, Section 8, of the Constitution quoted below, unless the same be paid within three months from the date of this notice, you will forfeit your connection with the Society.

Your attention is called to the provisions of the Constitution which are quoted below.

I trust the matter will receive your prompt attention.

Respectfully,

..... Secretary.

Form 14 is a blank form for reply to Form No. 2.

[FORM No. 15.]

AMERICAN SOCIETY OF CIVIL ENGINEERS.

NEW YORK.....

DEAR SIR :

In consequence of your failure to comply with the requirements of the Constitution, respecting the payment of dues to the Society, and no reason appearing for further delay, I am instructed by the Board of Direction to notify you, that, in accordance with the provisions of Article IV, Section 8, of the Constitution quoted below, you have forfeited your connection with the Society.

Notice of this action will appear in the published Proceedings of the Society.

Respectfully,

..... Secretary.

* The provisions of the Constitution referred to are found in Article III, Secs. 5, 6 and 8.

FEES, DUES, CERTIFICATE, BADGE.

ORDINARY FEES AND DUES,	RESIDENT.				NON-RESIDENT.			
	Members.	Associate Members.	Associates.	Juniors.	Members.	Associate Members.	Associates.	Juniors.
Entrance Fee.....	\$30.00	\$25.00	\$20.00	\$10.00	\$30.00	\$25.00	\$20.00	\$10.00
Yearly Assessment.....	25.00	25.00	15.00	15.00	15.00	15.00	10.00	10.00
Total, payable upon Election.....	\$55.00	\$50.00	\$35.00	\$25.00	\$45.00	\$40.00	\$30.00	\$20.00

Annual Contributions are due on the 1st day of January, and are payable in advance.

Persons elected members, after six months of any fiscal year have expired, pay only one-half of the amount of dues for that fiscal year, otherwise required.

Fellowship fee \$250 in one payment for life.

PROVISIONS FOR COMPOUNDING DUES.—All future annual dues may be compounded by a single payment by a Corporate Member of \$250; or by an Associate or Subscriber of \$150. Should a compounding Associate or Subscriber be elected to Corporate Membership, he shall pay the further sum of \$100.

Provided, that all compounding Corporate Members, Associates or Subscribers who may be or hereafter become Resident, shall be and remain liable for the annual payment of the difference between the annual dues of Resident and Non-Resident Corporate Members, Associates or Subscribers; but any Corporate Member may at any time compound for the future payment of all annual dues of every nature and kind by the payment of \$75 in addition to the \$250 hereinbefore named; and any Associate or Subscriber may at any time compound for the future payment of all annual dues as Associate or Subscriber by the payment of \$40 in addition to the \$150 hereinbefore named.

Provided, that any person desiring to compound for future dues shall have paid his entrance fee, all arrears of dues, and the annual dues for the current year, before the compounding sum may be available.

Persons compounding shall sign an agreement that they will be governed by the Constitution and Laws of the Society as they are now formed, or as they may be hereafter altered, amended or enlarged; and that in case of their ceasing to be connected with the Society from any cause whatever, the amount theretofore paid by them for compounding, and for entrance fees and annual dues, shall be the property of the Society.

CERTIFICATES OF MEMBERSHIP.—The prices, to cover cost of Certificates, are as follows:

Parchment	\$2.25
Parchment Paper.....	1.25
Plate Paper	1.25

BADGE.—This is of gold and enameled, with the member's name and a number engraved on the back, and is mounted either as an ordinary pin, a scarf pin, or a watch charm, as directed. The price is \$5, which includes engraving the name and number. Badges can be secured only by means of an order signed by the Secretary.

REMITTANCES.—All remittances should be made payable to the order of the American Society of Civil Engineers. They should be in drafts on New York, or in Postal Money Orders payable at the New York Post-Office (not at a branch office).

THE NORMAN MEDAL.

CODE OF RULES FOR ITS AWARD.

I.—Competition for the Norman Medal of the American Society of Civil Engineers shall be restricted to Members of the Society.

II.—There shall be one gold medal, and only one, struck for each and every fiscal year of the Society, and awarded as hereinafter provided. The dies therefor shall be with the Superintendent of the United States Mint at Philadelphia, in trust exclusively for the above purpose. Such medal shall be of a cost equal to the annual interest received upon \$1,000 of the Consolidated Stock of the City of New York, Certificate No. 179, of the additional new Croton Aqueduct Stock of the City of New York, authorized by an Act of the Legislature of the State of New York, Chap. 230, passed April 15, 1870, dated November 17, 1873, now held in trust by the Treasurer of this Society, and so held solely for this purpose, and shall be executed upon his order.

III.—All original papers presented to the Society by Members of any class, during the year for which the medal is awarded, shall be open to the award, provided that such papers shall not have been previously contributed in whole or in part to any other association, nor have appeared in print prior to their publication by the Society, nor have been presented to the Society in any previous year.

IV.—The Board of Censors to award the medal shall consist of three Members of the Society, to be designated by the Board of Direction. The Secretary of the Society shall act as Secretary to the Board of Censors.

V.—The medal shall be awarded to such paper as the said Board shall judge to be worthy of special commendation for its merits as a contribution to engineering science, not merely relatively as compared with others presented during the same years, but as exhibiting the science, talent or industry displayed in the consideration of the subject treated of, and for the good which may be expected to result from the discussion and the inquiry.

VI.—In case no paper presented during the year shall be deemed of sufficient value to receive an award, the amount of the interest of the fund for that year shall be expended by the Board of Direction in the purchase of books to be offered as a premium for the second best paper in the next year in which more than one paper of sufficient value may be presented.

VII.—The medal year shall terminate on the first day of August, and the award shall be announced at the Annual Meeting.

VIII.—The Treasurer of this Society shall cause the medal to be prepared and delivered to, or deposited to the order of, the successful competitor, within two months after the annual meeting at which the same shall have been awarded.

THE ROWLAND PRIZE.

CODE OF RULES FOR ITS AWARD.

Not more than one prize shall be awarded each year for papers prepared during the year. The year shall terminate on the first day of August, and the award shall be announced at the Annual Meeting.

The prize shall consist of \$50 in cash.

The award shall be made by a committee consisting of the Secretary and two Members of the Society, to be appointed by the Board of Direction.

The prize shall be awarded to such paper as the Committee deem most worthy of such recognition, the preference being given to papers describing in detail accomplished works of construction, their cost and manner of execution, and the errors in design and execution.

ABBREVIATIONS FOR DESIGNATING MEMBERSHIP.

The Board of Direction has declared the following as the authorized abbreviations to be used by Members of the Society having occasion to designate themselves as such :

FOR HONORARY MEMBERS,	-	-	Hon. M. Am. Soc. C. E.
FOR MEMBERS,	-	-	M. Am. Soc. C. E.
FOR ASSOCIATE MEMBERS,	-	Assoc. M. Am. Soc. C. E.	
FOR ASSOCIATES,	-	-	Assoc. Am. Soc. C. E.
FOR JUNIORS,	-	-	Jun. Am. Soc. C. E.
FOR FELLOWS,	-	-	F. Am. Soc. C. E.

The Board of Direction requests the use of the above forms in all cases.

PROVISIONS OF THE LAWS OF THE STATE OF NEW YORK
APPLICABLE TO THE AMERICAN SOCIETY OF
CIVIL ENGINEERS.

ORIGINALLY INCORPORATED 1852.

INCORPORATED UNDER THESE LAWS, 1877.

REVISED STATUTES OF THE STATE OF NEW YORK. VIIITH EDITION, FEBRUARY
1ST, 1889. PART I. CHAPTER XVIII. TITLE 4C. ARTICLE 3D. L. 1884,
CHAP. 319, AN ACT FOR THE INCORPORATION OF BENEVOLENT, CHARITABLE,
SCIENTIFIC AND MISSIONARY SOCIETIES.

Corporators; Objects; Certificate, contents of; Change of Title of Managing Board, or increase or decrease of number of Members; consent of Justice of Supreme Court. Section 1.

Any five or more persons of full age, citizens of the United States, a majority of whom shall be citizens of, and resident within, this State, who shall desire to associate themselves for benevolent, charitable, literary, historical, scientific, missionary or mission or Sunday-school purposes, or for the purpose of mutual improvement in religious knowledge, or for the furtherance of religious opinion, or for the purpose of promoting and cultivating the fine arts by establishing a gallery or collection of pictures and statuary, including other objects of the fine arts, and for the purpose of maintaining a library, or as a society for the prevention of crime, or for any two or more of such objects, may make, sign and acknowledge before any officer authorized to take the acknowledgment of deeds in the State, and file in the office of the Secretary of State, and also in the office of the Clerk of the County in which the business of such society is to be conducted, a certificate in writing, in which shall be stated the name or title by which such society shall be known in law, the particular business and objects of such society, the number of trustees, directors or managers to manage the same, and the names of the trustees, directors or managers of such society for the first year of its existence. And any corporation organized, or which may hereafter be organized, under the provisions of this Act, may from time to time change the title of the members of their managing board, or increase or decrease the number thereof to not less than five, on the consent in writing of not less than two-thirds of their number. A certificate of such change, executed as hereinabove provided for the original certificate, shall be filed with the original certificate; but neither such original certificate nor such amendment thereof shall be filed unless by the written consent and approbation of one of the Justices of the Supreme Court of the district in which the place of business or principal office of such company or association shall be located, to be endorsed on such certificate.

[Thus amended by L. 1883, ch. 446, superseding L. 1881, ch. 526.]

Corporation then formed; powers; property and income limited. § 2.—Upon filing a certificate as aforesaid, the persons who shall have signed and acknowledged such certificate and their associates and successors, shall thereupon by virtue of this Act, be a body politic and corporate by the name stated in such certificate, and by that name they and their successors shall and may have

succession, and shall be persons in law capable of suing and being sued, and they and their successors may have and use a common seal, and the same may alter and change at pleasure; and they and their successors, by their corporate name shall, in law, be capable of taking, receiving, purchasing and holding real and personal estate for the purposes of their incorporation, and for no other purpose, to an amount not exceeding in the aggregate the sum of two million dollars in value; but the clear annual income of such real and personal estate shall not exceed the sum of two hundred thousand dollars; to make by-laws for the management of its affairs, not inconsistent with the constitution and laws of this State, or of the United States; to elect and appoint the officers and agents of such society, for the management of its business, and to allow them a suitable compensation.

[*Thus amended by L. 1885, ch. 88, superseding L. 1872, ch. 649.*]

Election of Trustees, etc. § 3.—The society so incorporated may annually elect, from its members, its trustees, directors or managers, at such time and place, and in such manner, as may be specified in its by-laws, who shall have the control and management of the affairs and funds of said society, a majority of whom shall be a quorum for the transaction of business, if not otherwise provided in the by-laws, except that no such purchase, lease or sale of real estate shall be made unless two-thirds of the whole number are present at the meeting at which it is ordered; and whenever any vacancy shall happen among such trustees, directors or managers, by death, resignation, or neglect to serve, such vacancy shall be filled in such manner as shall be provided by the by-laws of such society.

[*Thus amended by L. 1853, ch. 487.*]

Provision in case no election is made. § 4.—In case it shall at any time happen that an election of trustees, directors or managers shall not be made on the day designated by the by-laws, said society for that cause shall not be dissolved, but it shall and may be lawful on any other day to hold an election for trustees, directors or managers, in such manner as may be directed by the by-laws of such society.

Restriction. § 5.—The provisions of this act shall not extend or apply to any association or individuals who shall, in the certificate filed with the Secretary of State, or with the County Clerk, use or specify a name or style the same as that of any previously existing incorporated society in this State.

[*Thus amended by L. 1861, ch. 239.*]

Real or personal property may be held, etc.; proviso. § 6.—Any corporation formed under this Act shall be capable of taking, holding or receiving any property, real or personal, by virtue of any devise or bequest contained in any last will or testament of any person whatsoever, the clear annual income of which devise or bequest shall not exceed the sum of ten thousand dollars; provided, no person leaving a wife or child or parent, shall devise or bequeath to such institution or corporation more than one-fourth of his or her estate, after the payment of his or her debts, and such devise or bequest shall be valid to the extent of such one-fourth; and no such devise or bequest shall be valid in any will which shall not have been made and executed at least two months before the death of the testator.

Liability of Trustees. § 7.—The trustees of any company or corporation organized under the provisions of this Act, present at any meeting authorizing the contracting of any debt, and acquiescing in the passage of any resolution or order authorizing the same, shall be jointly and severally liable for any such debt, provided a suit for the collection of the same shall be brought within one year after the debt shall become due and payable.

[*Thus amended by L. 1853, ch. 487.*]

Institutions subject to Visitation by Justices of Supreme Court. § 8.—All institutions formed under this Act, together with their books and vouchers shall be subject to the visitation and inspection of the Justices of the Supreme Court, or by any person or persons who shall be appointed by the Supreme Court for that purpose ; and it shall be the duty of the trustees, or a majority of them, in the month of December in each year, to make and file in the County Clerk's office where the original certificate is filed, a certificate under their hands, stating the names of the trustees and officers of such association or corporation, with an inventory of the property, effects and liability thereof, with an affidavit of the truth of such certificate and inventory, and also an affidavit that such association or corporation has not been engaged directly or indirectly in any other business than such as is set forth in the original certificate on file.

General powers. § 9.—Every corporation formed under this act shall possess the powers and be subject to the provisions and restrictions contained in the third title of the eighteenth chapter of the first part of the Revised Statutes.

[*Thus amended by L. 1849, ch. 273.*]

Right to repeal. § 10.—The Legislature may at any time amend, annul or repeal any incorporation formed or created under this Act.

Increase of Trustees. § 11.—The number of trustees, directors or managers in any corporation which may have been heretofore, or which may hereafter be, organized under the said Act, may be increased as follows: The existing trustees of any such corporation, or a majority thereof, shall make and sign a certificate declaring how many trustees, directors or managers the corporation shall have in the future management of its business, and stating the names of the new or additional trustees, directors or managers, which certificate shall be acknowledged or be proved by a subscribing witness, and shall be filed in the office of the Secretary of State, and also in the office of the Clerk of the County where the original certificate of incorporation was filed ; and from and after the filing of such certificate, the trustees, directors or managers of such corporation shall be deemed increased to the number therein stated, and the persons so named shall be trustees until a new election of trustees, directors or managers shall be had according to said Act and the by-laws or regulations of said corporation.

[*Added by L. 1875, ch. 452.*]

Extending corporate existence. § 13.—The term of existence of any corporation which may have heretofore been, or which may hereafter be, organized, under this Act, may be extended in the following manner: The trustees of such corporation, or a majority of them, shall make and sign a certificate de-

claring the term, not exceeding fifty years, for which the said corporation is to be continued, which certificate shall be duly acknowledged, and be filed in the office of the Secretary of State, and also a copy thereof in the office of the Clerk of the County where the original certificate of incorporation was filed; and from and after the filing of such certificate and copy, the said corporation shall be deemed continued for the term of years therein specified.

[*Added by L. 1876, ch. 190.*]

Societies may re-incorporate themselves. § 2.—The trustees, directors, or stockholders of any existing benevolent, charitable, scientific or missionary corporation may, by conforming to the requirements of the first section of the Act hereby amended, re-incorporate themselves or continue their existing corporate powers for the period limited by the Act hereby amended, and all the property and effects of such existing corporation shall vest in and belong to the corporation so re-incorporated or continued.

By application to the Supreme Court. SECTION 1.—It shall be lawful for the Supreme Court of this State, upon the application of any benevolent, charitable, scientific, or missionary society incorporated by law, in case it shall deem it proper, to make an order for the mortgaging of any real estate belonging to said corporation, and to direct the application of the moneys arising therefrom, by the said corporation, to such uses as the same corporation, with the consent and approbation of the said Court, shall conceive to be most for the interest of the society to which the real estate so mortgaged belongs.

By application to the Supreme Court. SECTION 1.—It shall be lawful for the Supreme Court of this State, upon the application of three-fourths of the trustees of any benevolent, charitable, scientific, missionary society or orphan asylum incorporated by law, in case it shall deem it proper, to make an order for the leasing or sale and conveyance of any real estate belonging to such corporation, and to direct the application of the moneys arising therefrom by the said corporation to such uses as to the said Court shall seem to be most for the interest of the corporation to which the real estate so leased or conveyed belongs.

Act extended to educational institutions and parsonages. SECTION 1.—The "Act for the Incorporation of Benevolent, Charitable, Scientific, and Missionary Purposes," passed April twelfth, eighteen hundred and forty-eight, shall be deemed to authorize the incorporation of any society for the purpose of establishing and maintaining any educational institution or chapel, or place of Christian worship, or any parsonage, rectory, or official residence of any bishop, pastor or minister of any Christian church or association.

Classification of trustees. § 2.—It shall be lawful for the trustees or managers of any society incorporated under the Act aforesaid, or under this Act, to provide in their by-laws for the classification and the mode of perpetuating the board of trustees or managers, and filling vacancies therein, as the same may occur.

Existing societies. § 5.—This Act shall apply as well to societies heretofore organized under the aforesaid Act, as to those which shall be hereafter organized.

PROVISIONS OF TITLE III. APPLICABLE TO THE SOCIETY.

SECTION 1. Every corporation, as such, has power,—

1. To have succession by its corporate name, for the period limited in its charter ; and when no period is limited, perpetually :

2. To sue and be sued, complain and defend, in any court of law or equity:

3. To make and use a common seal, and alter the same at pleasure:

4. To hold, purchase and convey such real and personal estate as the purposes of the corporation shall require, not exceeding the amount limited in its charter:

5. To appoint such subordinate officers and agents as the business of the corporation shall require, and to allow them a suitable compensation:

6. To make by-laws, not inconsistent with any existing law, for the management of its property, the regulation of its affairs, and for the transfer of its stock.

§ 2. The powers enumerated in the preceding section shall vest in every corporation that shall hereafter be created, although they may not be specified in its charter or in the act under which it shall be incorporated.

§ 3. In addition to the powers enumerated in the first section of this title, and to those expressly given in its charter, or in the act under which it is or shall be incorporated, no corporation shall possess or exercise any corporate powers, except such as shall be necessary to the exercise of the powers so enumerated and given.

§ 9. Upon the dissolution of any corporation created, or to be created, and unless other persons shall be appointed by the Legislature, or by some Court of competent authority, the directors or managers of the affairs of such corporation, at the time of its dissolution, by whatever name they may be known in law, shall be the trustees of the creditors and stockholders of the corporation dissolved, and shall have full power to settle the affairs of the corporation, collect and pay the outstanding debts, and divide among the stockholders the moneys and other property that shall remain, after the payment of debts and necessary expenses.

§ 10. The persons so constituted trustees shall have authority to sue for and recover the debts and property of the dissolved corporation by the name of the trustees of such corporation, describing it by its corporate name, and shall be jointly and severally responsible to the creditors and stockholders of such corporation to the extent of its property and effects that shall come into their hands.

List of Officers and Members.

OCTOBER, 1892.

It is particularly requested that every change of address be immediately communicated to

THE SECRETARY,

AMERICAN SOCIETY OF CIVIL ENGINEERS,

127 EAST TWENTY-THIRD STREET,

NEW YORK, N. Y.

American Society of Civil Engineers.

OFFICERS, 1892.

President, MENDES COHEN.

Vice-Presidents for two years—Term expires January, 1894 :

CHARLES B. BRUSH, SAMUEL WHINERY.

Vice-Presidents for one year—Term expires January, 1893 :

SAMUEL M. GRAY, JOHN MACLEOD.

Secretary, FRANCIS COLLINGWOOD.

Treasurer, JOHN BOGART.

Directors for three years—Term expires January, 1895 :

LEFFERT L. BUCK, WM. P. CRAIGHILL, DESMOND FITZGERALD, ABRAHAM GOTTLIEB,
BENJAMIN M. HARROD, JOHN THOMSON.

Directors for two years—Term expires January, 1894 :

THEODORE N. ELY, GEORGE W. McNULTY, ROBERT MOORE, OTHNIEL F. NICHOLS,
P. ALEX. PETERSON, ROBERT L. READ.

Directors for one year—Term expires January, 1893 :

E. A. FUERTES, ALBERT B. HILL, CHARLES H. MYERS, E. T. D. MYERS, JAMES D. SCHUYLER,
JOHN G. VAN HORNE.

Past-Presidents, Members of the Board :

JULIUS W. ADAMS, GEORGE S. GREENE, ALBERT FINK, CHARLES PAINE, DON J. WHITE-
MORE, HENRY FLAD, WM. E. WORTHEN, THOMAS C. KEEFER, M. J. BECKER,
O. CHANUTE.

Assistant Secretary, CHARLES WARREN HUNT.

Auditor, THOMAS B. LEE.

PRESIDENTS OF THE SOCIETY.

JAMES LAURIE,*

November 5, 1852, to November 6, 1867.

JAMES P. KIRKWOOD,*

November 6, 1867, to August 5, 1868.

WILLIAM J. MCALPINE,*

August 5, 1868, to November 3, 1869.

ALFRED W. CRAVEN,*

November 3, 1869, to November 1, 1871.

HORATIO ALLEN,*

November 1, 1871, to November 5, 1873.

JULIUS W. ADAMS,

November 5, 1873, to November 3, 1875.

GEORGE S. GREENE,

November 3, 1875, to November 7, 1877.

E. S. CHESBROUGH,*

November 7, 1877, to November 6, 1878.

W. MILNOR ROBERTS,*

November 6, 1878, to November 5, 1879.

ALBERT FINK,

November 5, 1879, to November 3, 1880.

JAMES B. FRANCIS,*

November 3, 1880, to January 18, 1882.

ASHBEL WELCH,†

January 18, 1882, to September 25, 1882.

CHARLES PAINE,

January 17, 1883, to January 16, 1884.

DON J. WHITTEMORE,

January 16, 1884, to January 21, 1885.

FREDERIC GRAFF,*

January 21, 1885, to January 20, 1886.

HENRY FLAD,

January 20, 1886, to January 19, 1887.

WILLIAM E. WORTHEN,

January 19, 1887, to January 18, 1888.

THOMAS C. KEEFER,

January 18, 1888, to January 16, 1889.

MAX J. BECKER,

January 16, 1889, to January 15, 1890.

WILLIAM P. SHINN,*

January 15, 1890, to January 21, 1891.

O. CHANUTE,

January 21, 1891, to January 20, 1892.

MENDES COHEN,

January 20, 1892.

* Deceased. † Mr. Ashbel Welch died September 25, 1882, during his term of office as President.

List of Members.

HONORARY MEMBERS.

[Hon. M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ADAMS, JULIUS W.	(<i>Past-President.</i>) 155 Con- gress st., Brooklyn, N.Y.	M. Nov. 5, 1852 Hon. M. Oct. 26, 1888
CAMPBELL, ALLAN	125 Lexington ave., New York City.	M. Feb. 19, 1868 Hon. M. Mar. 1, 1892
DUANE, JAMES C.	Brig.-Gen. U. S. A., 280 Broadway, New York City.	Nov. 20, 1886
GREENE, GEORGE SEARS	(<i>Past-President.</i>) Maj.-Gen., 14 Wetmore ave., Mor- ristown, N. J.	M. Nov. 5, 1852 Hon. M. Oct. 26, 1888
NEWTON, JOHN	Brig. and Bvt. Maj.-Gen., Ch. of Engrs., U. S. A. (Retired), Panama R. R. office, 29 Broadway, New York City.	April 30, 1884
WILSON, W. HASELL	Pres. P. and E. R. R., 233 South 4th st., Philadelphia, Pa.	Aug. 2, 1892
WRIGHT, HORATIO G.	Brig. and Bvt. Maj.-Gen., U. S. A., 1203 N st., N. W., Washington, D.C.	Mar. 3, 1880
YOUNG, WILLIAM C.	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	Mar. 1, 1892

CORRESPONDING MEMBERS.

Name.	Address.	Date of Membership.
FOX, Sir DOUGLAS	28 Victoria st., Westminster, Lon- don, England.	June 7, 1871
GLEIM, CHARLES OTTO	Div. Eng. Bau-Deputation, 17 Blei- chenbrücke, Hamburg, Germany.	April 5, 1876
PONTZEN, ERNEST	Civil and Cons. Eng., 3 Avenue du Coq, Paris, France.	Jan. 5, 1876

MEMBERS.

[M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOT, FREDERIC V.	Capt. Corps of Engs., U. S. A., U. S. Eng. Office, 12 Southern Wharf, Charleston, S. C.	Dec. 3, 1884
ABBOTT, JOB	Cons. Eng. B. and A. R. R.; W. and C. Ry.; M. P. and S. Ry., 150 Broadway, Room 31, New York City.	April 1, 1891
ABERT, S. THAYER	U. S. Agent and Civ. Eng., 1928 1/2 Penna. ave., Washington, D. C.	Sept. 21, 1870
AERTSEN, GUILLIAEM	Man. Latrobe Steel Works, Latrobe, Pa.	Oct. 1, 1890
AIKEN, WILLIAM A.	Res. Eng. Pittsburgh Test. Laboratory, 765 The Rookery, Chicago, Ill.	Oct. 2, 1889
AINSWORTH, DANFORTH H.	Newton, Iowa.	Mar. 3, 1886
ALDEN, JOHN F.	Rochester Bridge and Iron Works, Rochester, N. Y.	July 6, 1887
ALDRICH, JAMES C.	Chopmist, P. O., Providence Co., R. I.	May 7, 1873
ALDRICH, TRUMAN H.	92 Southern ave., Mt. Auburn, Cincinnati, Ohio.	May 4, 1881
ALLEN, CHARLES A.	City Eng., Worcester, Mass.	June 4, 1879
ALLEN, C. FRANK	Assoc. Prof. R. R. Engineering, Mass. Inst. Tech., Boston, Mass.	Feb. 6, 1878
ALLEN, CALVIN H.	The Dakota, 1 West 72d st., New York City.	Sept. 7, 1887
ALLEN, JAMES P.	126 Wentworth st., Charleston, S. C.	Mar. 5, 1879
ALLEN, KENNETH	H. C. Frick Coke Co., Scottdale, Pa.	June 4, 1884
ALLEN, WILLIAM ALBERT	Ch. Eng. M. C. R. R., Portland, Me.	May 2, 1888
AMBROSE, WILLIAM C.	Res. Eng. Southern Pacific Co., Tulare, Cal.	May 6, 1891
AMWEG, FREDERICK J.	Civil Eng. and Archt., Keystone Bank Bldg., Philadelphia, Pa.	April 4, 1888
ANDERSON, LATHAM	Landscape Architect Board of Park Commrs., Johnston Bldg., Room 49, Cincinnati, Ohio.	Mar. 7, 1888
ANDREWS, D. M.	U. S. Asst. Eng., Lincoln, Ala.	May 2, 1888
ANDREWS, DAVID H.	Proprietor of Boston Bridge Works, 70 Kilby st., Boston, Mass.	Mar. 2, 1892
		Sept. 2, 1885

Name.	Address.	Date of Membership.
ANDREWS, HORACE	City Eng., Albany, N. Y.	April 6, 1887
ANDREWS, JOHN W.	(Care K. C. F. S. & M. R. R.), Kansas City, Mo.	Mar. 1, 1882
ANNAN, CHARLES L.	Office Eng. Dept. Public Works, St. Paul, Minn.	July 4, 1888
APPLETON, ELLERY C.	Asst. Eng. Boston Water Works, Westboro, Mass.	June 3, 1885
APPLETON, THOMAS	Civil Eng., 637 Rialto Bldg., Chicago, Ill.	April 4, 1883
ARCHBALD, JAMES	Cons. Eng. Delaware, Lackawanna & Western R. R., Scranton, Pa.	May 15, 1872
ARCHER, WILLIAM	Asst. Eng. Baltimore & Ohio South-western R. R., Cincinnati, Ohio.	Mar. 2, 1881
ARCHIBALD, PETER S.	Ch. Eng. Intercolonial Ry., Montreal, N. B., Canada.	Jan. 7, 1885
ARMINGTON, JAMES H.	Cons. Eng., Riverside, R. I.	July 6, 1870
ARTINGSTALL, SAMUEL G.	Civil Eng., 28 Rialto Bldg., Chicago, Ill.	Oct. 6, 1886
ASHMEAD, FRANK M.	Res. Eng. Allegheny Valley Ry., Pittsburgh, Pa.	July 6, 1887
ASPINWALL, THOMAS	12 Pearl st., Boston, Mass.	May 2, 1888
ASSERSON, PETER C.	Civil Eng., U. S. N., U. S. Navy Yard, Brooklyn, N. Y.	July 5, 1882
ATKINSON, JOHN B.	Vice-Pres. and Treas. St. Bernard Coal Co., Earlington, Ky.	Sept. 5, 1877
ATWATER, A. B.	Supt. Grand Trunk Lines west of St. Clair Tunnel, Detroit, Mich.	May 5, 1886
AUCHINCLOSS, WILLIAM S.	209 Church St., Philadelphia, Pa.	Feb. 17, 1869
AULLS, HERBERT L.	Pioneer Bldg., Room 33, Denver, Colo.	July 1, 1885
AXTELL, DECATUR	2d Vice-Pres. Chesapeake & Ohio Ry., Main St., Richmond, Va.	Mar. 3, 1886
AYRES, HENRY W.	Res. Eng., City Water Works, Hartford, Conn.	Mar. 5, 1890
BABCOCK, HENRY N.	U. S. Asst. Engineer, Army Bldg., New York City.	Sept. 3, 1884
BACON, JOHN W.	State Commissioner Connecticut Topographical Survey, Danbury, Conn.	July 12, 1877
BACOT, WILLIAM SINCLAIR	Eng. of County Roads, Richmond Co., P.O. Box 596, Stapleton, Richmond Co., N. Y.	Oct. 1, 1890
BAILEY, GEORGE IRVING	Supt. Albany Water Works, 61 State st., Albany, N. Y.	Oct. 1, 1890
BAKER, HOLLAND W.	Civil Eng., 441 D st., Tacoma, Wash.	May 7, 1890

Name.	Address.	Date of Membership.	
BAKER, WILLIAM H.	Ch. Eng. Pan-American Ry., Victoria, Texas.	Sept.	6, 1882
BALDWIN, FRED. H.	Lisbon Falls Fibre Co., Lisbon Falls, Me.	Nov.	5, 1884
BALDWIN, THOMAS W.	Exchange Block, Room 1, Bangor, Me.	April	2, 1884
BALDWIN, WARD	Prof. of Civil Eng., University of Cincinnati, Cincinnati, Ohio.	J. Mar.	2, 1882
		M. Oct.	2, 1889
BALDWIN, WM. HENRY	Manor Hall, Yonkers, N. Y.	June	6, 1888
BALDWIN, WILLIAM J.	Mech. Eng., 277 Pearl st., New York City.	Sept.	5, 1888
BALL, CHARLES B.	Asst. Eng. Dist. Govt. (Residence, 942 T st., N. W.), Washington, D. C.	Oct.	1, 1890
BALLARD, ROBERT	Rockhampton, Queensland, Australia.	Sept.	1, 1880
BARLOW, JOHN Q.	Eng. and Contr., Room 23, N. P. R. R. Bldg. (P. O. Box 198), Tacoma, Wash.	J. April	7, 1886
		M. July	4, 1888
BARNARD, JOHN F.	37 Auburn st., Cincinnati, Ohio.	Sept.	1, 1880
BARNES, DAVID L.	Cons. Eng., 706 The Rookery, (Residence, 575 E. Division st.), Chicago, Ill.	July	2, 1890
BARNES, OLIVER W.	Ch. Eng. New York & Long Island R. R., 57 Broadway, New York City.	July	6, 1881
BARR, CARY CALVERT	240 Eleventh st., Jersey City, N. J.	Sept.	7, 1892
BARR, JACOB N.	Supt. Motive Power, Chicago, Milwaukee & St. Paul Ry., (Residence, 3028 Wells st.), Milwaukee, Wis.	Nov.	7, 1888
BARTLETT, WINTHROP	Ch. Eng. St. Louis & Suburban Ry., Cons. Eng., 56 Turner Bldg., St. Louis, Mo.	Jan.	2, 1889
BASSEL, ROBERT	Royal Inspector of Ry. Construction and Traffic, Frankfurt, Germany.	May	2, 1888
BASSETT, CARROLL PH.	Cor. Broad and Market sts., Newark, N. J.	Nov.	7, 1888
BATES, CHARLES J.	Civil and Mech. Eng., 126 Liberty st., New York City.	May	1, 1889
BATES, ONWARD	Eng. and Supt. Bridges and Bldgs., C. M. & St. P. Ry., 617 Randall McNally Bldg., Chicago, Ill.	Jan.	4, 1882
BAXTER, GEORGE S.	Treas. Northern Pacific R. R., 17 Broad st., New York City.	J. May	12, 1875
		M. May	3, 1876

Name.	Address.	Date of Membership.	
BAYLISS, RAWLINSON T.	54 Old Broad st., London, E. C., England.	June 4,	1890
BEAHAN, WILLARD	205 High st., Streator, Ill.	April 3,	1889
BEARDSLEY, ARTHUR	Prof. Eng. and Director Me- chanic Arts, Swarthmore Col- lege, Swarthmore, Pa.	{ A. Sept. 1, M. Sept. 2,	1875 1891
BECKER, MAX J.	(Past-President.) Ch. Eng. Pittsburgh, Cincinnati and St. Louis R. R., Pittsburgh, Pa.		
BECKLER, ELBRIDGE HARLOW	Ch. Eng. Pacific Ex. St. P., M. & M. Ry., Great Northern Ry., Helena, Mont.	Aug. 7,	1872
BECKWITH, LEONARD F.	Ch. Eng. Consolidated Telegraph & Electrical Subway Co., 113 W. 38th st., New York City.	April 6,	1892
BELL, ANDREW	Cons. Eng., Almonte, Ontario, Canada.	Dec. 16,	1868
BELL, HENRY P.	Valdivia, Chili, S. A.	Sept. 5,	1883
BEMENT, ROBERT B. C.	Pres. Board Water Com., 402 Man- hattan Bldg., St. Paul, Minn.	June 4,	1884
BENSEL, JOHN A.	Asst. Eng. Dept. Docks, 64 East } 79th st., New York City. (J.	Sept. 7, Sept. 2,	1887 1885
BENSON, FRED. S.	Eng. Nassau Gas Light Co., cor. Kent ave. and Cross st., Brooklyn, N. Y.	Mar. 4,	1891
BENT, C. C. F.	Supt. Ohio & Mississippi Ry., Cin- cinnati, Ohio.	Feb. 7,	1877
BENYAUD, WILLIAM H. H.	Lieut.-Col. Corps Engs. U. S. A., Donohoe Bldg., San Francisco, Cal.	May 1,	1889
BENZENBERG, GEORGE H.	City Eng. and Pres. Board Public Works, Milwaukee, Wis.	Nov. 3,	1875
BERG, LOUIS DE COPPET	Architect, 31 East 17th st., New } York City. (A. June 6, M. Sept. 2,	A. June 6, M. Sept. 2,	1888 1891
BERGEN, VAN BRUNT	Prin. Asst. Eng., Dept. of City Works, Brooklyn, N. Y.		
BERRIAN, RICHARD M.	255 West 128th st., New York City.	June 17,	1868
BIDDLE, WILLIAM F.	209 S. Third st., Philadelphia, Pa.	May 4,	1887
BIGELOW, EDWARD M.	Ch. Eng. Dept. Pub. Works, Pitts- burgh, Pa.	June 4,	1884
BILLIN, CHARLES E.	Supt. 12th Street Works, Fraser } and Chalmers, Chicago, Ill. (J. April 5, M. July 3,	J. April 5, M. July 3,	1876 1878
BISHOP, GEORGE H.	Eng. Water Works, Middletown, Conn.		
BISHOP, THOMAS S.	Eng. Russell & Erwin Mfg. Co., New Britain, Conn.	Aug. 7,	1872
BISSELL, FRANK E.	South Bend, Ind.	Sept. 2,	1885
		{ J. April 2, M. Sept. 2,	1884 1891

Name	Address.	Date of Membership.
BISSELL, H.	Ch. Eng. Boston and Maine R. R., Boston, Mass.	Sept. 15, 1869
BIXBY, WILLIAM H.	Capt. Corps of Engs., U. S. A., Newport, R. I.	April 5, 1882
BLACK, WILLIAM MURRAY	Capt. Corps of Engs., U. S. A., In- structor Civil Eng., U. S. Eng. School, Willets Point, N. Y.	June 6, 1888
BLACKFORD, FRANCIS WEBSTER	City Eng., City Hall, Butte, Mont.	April 4, 1888
BLACKWELL, CHARLES	(Care Shoenberger & Co., Pitts- burgh, Pa.) Mt. Lookout, Cin- cinnati, Ohio.	Sept. 7, 1881
BLAISDELL, ANTHONY H.	Civil Eng. Mo. River Com., 1515 Lucas pl., St. Louis, Mo.	Mar. 3, 1880
BLAKE, EDWARD J.	Ch. Eng. Chicago, Burlington & Quincy R. R., Chicago, Ill.	April 3, 1889
BLAND, GEORGE P.	Civil Eng., 3218 Woodland ave., { J. West Philadelphia, Pa. { M.	April 7, 1875 May 4, 1881
BLAND, JOHN CARLISLE	Cons. Eng., 41 Hagerman Bldg., { J. Colorado Springs, Colo. { M.	June 1, 1875 June 4, 1879
BLICKENSDERFER, JACOB	Oakland, Laclede Co., Mo.	June 1, 1881
BLISS, HENRY I.	Civil Eng., La Crosse, Wis.	Sept. 5, 1883
BODFISH, SUMNER H.	Civil Eng., 58 B st., N. E., Washing- ton, D. C.	Oct. 2, 1889
BOEKE, AUGUSTUS W.	City Eng. and Eng. Bridges, Wyan- dotte Co., Argentine, Kans.	Sept. 3, 1890
BOGART, JOHN	(Treasurer.) Cons. Eng., 71 Broad- way, New York City.	Feb. 17, 1869
BOGUE, VIRGIL G.	Portland, Ore.	Sept. 15, 1869
BOLLER, ALFRED P.	Cons. Eng., 71 Broadway, New York City.	Dec. 4, 1867
BOLTON, CHANNING M.	Ch. Eng. Richmond & Danville R.R., 1300 Penn. ave., Washing- ton, D. C.	Jan. 4, 1888
BOND, GEORGE M.	Man. Standards and Gauge Dept., The Pratt & Whitney Co. (Resi- dence, 141 Washington st.), Hart- ford, Conn.	Feb. 2, 1887
BONNETT, WILLIAM W.	Civil Eng., Waterbury, Conn.	Sept. 4, 1872
BONTECOU, DANIEL	Ch. Eng. K. C., F. S. & M. & K. C., M. B. & R. Rs., Kansas City, Mo.	Nov. 5, 1879
BONZANO, ADOLPHUS	Vice-Pres. and Ch. Eng. The Phoenix Bridge Co., Phoenixville, Pa.	Aug. 7, 1872
BONZANO, MAXIMILIAN F.	Gen. Supt. Main Line Div. Phila- delphia & Reading R. R., 227 S. Fourth st., Philadelphia, Pa.	Jan. 6, 1886
BOOKER, B. F.	Asst. Eng. A. T. & S. F. R. R., { J. Topeka, Kansas. { M.	Oct. 7, 1885 June 3, 1891

Name.	Address.	Date of Membership.	
BOOTH, WILLIAM H.	100 Bunhill Row, London, E. C., England.	July	4, 1888
BOTH, A. C.	U. S. Asst. Eng., U. S. Eng. office, Portland, Me.	Sept.	2, 1891
BOTT, JOHN B.	Prin. Asst. Eng. Baltimore Belt R. R., 2216 Oak st., Baltimore, Md.	Oct.	1, 1890
BOUSCAREN, LOUIS F. G.	Cons. Eng., Mitchell Bldg., Cincin- nati, Ohio.	April	7, 1875
BOWIE, AUGUSTUS J.	Cons. Eng., 217 Sansome st. (P. O. Box 2471), San Francisco, Cal.	Nov.	1, 1882
BOYD, CHARLES R.	Wytheville, Va.	April	6, 1881
BOYNTON, GEORGE H.	Asst. Eng. Chicago, Rock Island & Pacific Ry., Davenport, Iowa.	Sept.	3, 1884
BRACKENRIDGE, WILLIAM A.	Div. Eng. Cataract Cons. Co., Niag- ara Falls, N. Y.	June	2, 1886
BRACKETT, DEXTER	Asst. Eng. City Engineer's Office, City Hall, Boston, Mass.	June	6, 1888
BRADLEY, TIMOTHY C.	Pres. Cookson Mfg. Co., Kansas City, Mo.	Dec.	6, 1882
BRADLEY, WILLIAM H.	Civil Eng., 642 Exchange Bldg., Boston, Mass.	Feb.	5, 1879
BRAINARD, HENRY A.	San José, Cal.	Feb.	6, 1884
BRECKENRIDGE, CABELL	1028 Russell st., Covington, Ky.	June	1, 1881
BREEN, HOWARD	Cons. Bridge Eng. and Contr., 600 California Bldg., Denver, Colo.	April	4, 1888
BREITHAAPT, WILLIAM H.	Civ. Eng., 18 Broadway, New (J. York City. (M.	June	4, 1884
BRENDLINGER, PETER F.	79 Warburton ave., Yonkers, N. Y.	Sept.	7, 1887
BRIGGS, JOSIAH A.	Fordham, New York City.	Sept.	1, 1886
BRIGGS, ROSWELL E.	1439 William st., Denver, Colo.	Sept.	15, 1869
BRINCKERHOFF, ALEX. G.	Supt. Works Johnson & Morris, 114 Leonard st., New York City.	Nov.	3, 1886
BRINCKERHOFF, H. WALLER	Asst. Eng. in charge of office Broad- way Cable Road, 113 West 38th st., New York City.	Nov.	7, 1883
BRINSMADE, DANIEL S.	Eng. Ousatonic Water Co., Birming- ham, Conn.	Feb.	1, 1888
BRODHEAD, CALVIN E.	Caledonia, Livingston Co., N. Y.	Feb.	21, 1872
BROOKS, FRED.	Asst. Eng. Boston Water Works, (J. 31 Milk st., Boston, Mass. (M.	June	7, 1876
BROWN, ALBA FISK	Gen. Man. Keystone Bridge Dept., Carnegie Steel Co., Ltd., Pitts- burgh, Pa.	Jan.	2, 1884
BROWN, CHARLES I.	Eng. St. Louis & San Francisco Ry., 7th and Cerre sts., St. Louis, Mo.	Sept.	7, 1887
		Jan.	7, 1891

Name.	Address.	Date of Membership.		
BROWN, CHARLES O.	Pres. The Riverside Bridge and Iron Works, 18 Broadway, New York City.	J. M.	Jan. 6, 1875	Nov. 7, 1877
BROWN, E. L.	Civil Eng., Brockton, Mass.		Sept. 5, 1888	
BROWN, THOMAS E., Jr.,	Ch. Eng., Otis Bros. & Co., 38 Park Row, New York City.	J. M.	Nov. 3, 1880	April 2, 1884
BROWNE, GEORGE H.	Gen. Man. Phila. Co., 820 Penn. ave., Pittsburgh, Pa.		Sept. 3, 1884	
BRUEN, FRANK	Civil Eng., Constr. Eng. New Haven Water Co., Box 253, New Haven, Conn.		June 1, 1886	
BRUNER, DANIEL P.	Civil Eng., Germantown, Philadelphia, Pa.	J. M.	Sept. 6, 1876	May 7, 1879
BRUSH, CHARLES B.	(Vice-President.) Ch. Eng. and Supt. Hackensack Water Co., 1 Newark st., Hoboken, N. J.	A. M.	Sept. 6, 1871	Sept. 5, 1877
BRYSON, ANDREW	12 Broadway, Room 44, New York City.		April 1, 1885	
BUCHANAN, E. E.	Elmira Bridge Co., Ltd., Elmira, N. Y.		Dec. 4, 1889	
BUCHHOLZ, CARL W.	Civil Eng. New York, Lake Erie & Western R. R., 21 Cortlandt st., New York City.		Sept. 1, 1886	
BUCK, LEFFERT L.	(Director.) Civil Eng., 18 Broadway, New York City.		Feb. 3, 1875	
BUCK, WALDO E.	Special Insp. Assoc. Factory Mutual Ins. Co., 544 Main st., Woburn, Mass.		July 3, 1889	
BUDDE, OTTO	Oberingenieur, Hochstrasse 21, Essen, a/d Ruhr, Germany.		July 4, 1888	
BUDGE, ENRIQUE	Valparaiso, Chili.		Feb. 1, 1882	
BULLOCK, WILLIAM D.	Asst. Eng. in chg. Bridges and Harbor, City Eng.'s Office, Providence, R. I.	J. M.	Sept. 5, 1877	July 4, 1888
BURBANK, GEORGE B.	Res. Cons. Eng. Cataract Constr. Co., Niagara Falls, N. Y.		July 4, 1888	
BURDEN, JAMES A.	Pres. The Burden Iron Co., Troy, N. Y.		July 2, 1879	
BURGWYN, COLLINSON P. E.	819 E. Main st., Richmond, Va.		Nov. 1, 1882	
BURNET, GEORGE	Pres. Board Public Impvts., 4415 Washington ave., St. Louis, Mo.		Mar. 1, 1882	
BURNS, EDWARD C.	Cor. East 4th and Spring sts., Jamestown, N. Y.		July 5, 1882	
BURPEE, MOSES	Ch. Eng. Bangor & Aroostook R. R., Houlton, Me.		Sept. 3, 1881	
BURN, EDWARD	First Lieut. Corps of Engs., U. S. A., P. O. Box 283, Norfolk, Va.		May 6, 1891	

Name.	Address.	Date of Membership.	
BURR, WILLIAM H.	Prof. of Engineering Harvard Univ., and Cons. Eng., Cambridge, Mass.	J. A. M.	June 4, 1874 May 5, 1880 Mar. 3, 1886
BURROWES, FRANCIS S.	U. S. Asst. Eng., U. S. Engineer office, Portland, Me.		June 6, 1888
BUSH, H. D.	Civil Eng., Worcester Block, Room 53, Portland, Ore.		May 2, 1888
BUTLER, M. J.	Ch. Eng. K. N. & W. Ry., Napanee, Ontario, Canada.		April 1, 1885
BUTTERFIELD, FRANCIS E.	(Care C. P. Matlack), 175 Adams st., Chicago, Ill.		Sept. 1, 1886
BUXTON, CLIFFORD	Ch. Eng. Toledo & Ohio Central; Toledo, Columbus & Cincinnati; Kanawha & Michigan Rys., Toledo, Ohio.		May 6, 1885
BYLLESBY, HENRY M.	Prest. North West. Thomson-Houston Elec. Co., 403 Sibley st., St. Paul, Minn.		June 1, 1887
CAIN, WILLIAM	Prof. Mathematics and Engineering, University of North Carolina, Chapel Hill, N. C.		Nov. 7, 1888
CALKINS, FRANK A.	387 N. State st., Chicago, Ill.		April 5, 1882
CAMP, FRED A.	1709 Thomas pl., Minneapolis, Minn.		Sept. 3, 1884
CAMPBELL, CHARLES E. H.	Eng. and Gen. West. Agent Milwaukee Bridge and Iron Works, Council Bluffs, Iowa.		Oct. 3, 1883
CANFIELD, EDWARD	Ch. Eng. New York, Ont. & Western Ry., Middletown, N. Y.		Dec. 3, 1879
CARD, WILLIAM W.	Secretary, The Westinghouse Air Brake Co., Pittsburgh, Pa.		Sept. 5, 1883
CARPENTER, CLARENCE A.	Eng. L. S. Div. Lake Shore & Mich. Southern Ry., Cleveland, Ohio.		May 2, 1888
CARREL, FREDERICK J.	Cons. Eng., Spokane, Wash.		Mar. 5, 1884
CARTER, EDWARD C.	Prin. Asst. Eng. Chicago & North-Western Ry., Chicago, Ill.		April 4, 1888
CARTER, HENRY H.	Supt. of Streets, City Hall, Boston, Mass.		May 7, 1890
CARTER, J. R.	Civil Eng., Alabama Club, Birmingham, Ala.		Feb. 3, 1892
CARTER, OBERLIN M.	Capt. Corps Engrs., U. S. A., P. O. Drawer R., Savannah, Ga.		Mar. 7, 1888
CARTWRIGHT, ROBERT	Civil and Mech. Eng., 1 Hawthorn st., Rochester, N. Y.		July 10, 1872
CATT, GEORGE W.	Vice-Pres. and Eng. San Francisco Bridge Co., World Bldg., New York City.		Sept. 7, 1892

Name.	Address.	Date of Membership.
CHANUTE, OCTAVE	(<i>Past-President.</i>) Cons. Eng., 413 E. Huron st., Chicago, Ill.	Feb. 19, 1868
CHENEY, JOHN E.	Asst. City Eng., Boston, Mass.	May 7, 1884
CHILLS, JAMES E.	Gen. Man. N. Y., Ont. & W. R. R., 56 Beaver st., New York City.	Dec. 4, 1878
CHIPMAN, WILLIS	City Engineer, Brockville, Ontario, Canada.	June 6, 1888
CHITTENDEN, SAMUEL H.	East River, Conn.	April 5, 1876
CHRISTIE, JAMES	Ch. Eng. Pencoyd Iron Works, Pencoyd, Pa., or Wissahiekon, Philadelphia, Pa.	May 7, 1873
CHURCH, BENJAMIN S.	Cons. Eng., 54 West 12th st., New York City.	Dec. 4, 1867
CHURCH, CHARLES T.	Civil Eng., Geneva, N. Y.	May 1, 1889
CHURCH, GEORGE EARL	Dashwood House, E. C., London, England.	Nov. 2, 1887
CHURCHILL, CHARLES S.	Eng. Main. Way, Norfolk & Western R. R., Roanoke, Va.	May 1, 1889
CISNEROS, FRANCIS J.	Mang. Director Barranquilla Ry. & Pier Co., Barranquilla, U. S. Colombia.	May 15, 1872
CLAPP, LORENZO RUSSELL	Asst. Eng. Dept. City Works, 29 Municipal Bldg., Brooklyn, N. Y.	Feb. 1, 1888
CLARK, GEO. HUNTINGTON	Ch. Eng. East & West R. R. of Ala., Cedartown, Ga.	Mar. 5, 1890
CLARK, JACOB M.	119 Liberty st., New York' City, (Residence, 145 Madison ave., Elizabeth, N. J.)	Jan. 29, 1868
CLARKE, DAVID D.	South Bend, Wash.	July 5, 1882
CLARKE, ELIOT C.	15 Brimmer st., Boston, Mass.	Sept. 4, 1878
CLARKE, THOMAS C.	Cons. Eng., 44 Broadway, New York City.	Mar. 18, 1868
CLEEMANN, THOMAS M.	Civil Eng., 2135 Spruce st., Philadelphia, Pa.	Oct. 1, 1879
CLEMENT, FRANK H.	Niagara Falls, N. Y.	Nov. 1, 1882
COBB, ROBERT L.	Clarksville, Tenn.	Jan. 2, 1890
CODWISE, EDWARD B.	City Eng., Kingston, N. Y.	Sept. 5, 1888
COE, WILLIAM W.	Ch. Eng. Norfolk & Western R. R., Roanoke, Va.	April 3, 1889
COFFIN, AMORY	Ch. Eng. Phenix Iron Co., Phenixville, Pa.	Mar. 3, 1875
COFFIN, WILLIAM B.	Supt. J. T. & K. W. Ry., Jacksonville, Fla.	Nov. 6, 1872
COGSWELL, WILLIAM B.	Gen. Man. The Solvay Process Co., Syracuse, N. Y.	Feb. 15, 1871
COHEN, MENDES	(<i>President.</i>) 825 N. Charles st., Baltimore, Md.	Oct. 16, 1872
		Dec. 4, 1867

Name.	Address.	Date of Membership.
COLLINGWOOD, FRANCIS	(Secretary.) 127 East 23d st., New York City. (Residence, Elizabeth, N. J.)	Mar. 10, 1869
COLTON, OREN B.	2009 Wallace st., Philadelphia, Pa.	April 2, 1884
COMSTOCK, CYRUS B.	Col. Corps of Engs., Bvt. Brig.-Gen. U. S. A., Army Bldg., 39 Whitehall st., New York City.	Sept. 1, 1880
CONNETT, ALBERT N.	Ch. Eng. Balto. City Passenger Ry., 210 E. Lexington st., Baltimore, Md. { J. June 6, 1883 M. Oct. 1, 1890	
CONSTABLE, CASIMIR	Constableville, N. Y.	June 17, 1868
COOLEY, GEORGE W.	642 Boston Block, Minneapolis, Minn.	Sept. 2, 1885
COOLMAN, DEWITT C.	Ravenna, Ohio.	Mar. 4, 1874
COOPER, SAMUEL L.	Asst. Eng. N. Y. Finance Dept., Shonnard Terrace, Yonkers, N. Y.	Feb. 6, 1889
COOPER, THEODORE	Cons. Eng., 35 Broadway, New York City.	Mar. 4, 1874
COPPEE, H. ST. L.	U. S. Asst. Eng., Vicksburg, Miss.	Oct. 5, 1887
CORNELL, GEORGE B.	Ch. Eng. East River Bridge Co., 120 Broadway, New York City. { J. Aug. 6, 1879 M. Oct. 6, 1886	
CORTHELL, ELMER L.	Cons. Eng., The Temple, 184 La Salle st., Chicago, Ill.	Sept. 2, 1874
COTTON, JOSEPH P.	Civil and Sanitary Eng., Newport, R. I.	June 7, 1876
COURTENAY, WILLIAM H.	Prin. Asst. Eng. Louisville & Nashville R. R., Louisville, Ky.	July 3, 1889
COVODE, JAMES H.	41 Sheldon st., Grand Rapids, Mich.	April 2, 1890
COWLES, WALTER L.	Ch. Eng. The Youngstown Bridge Co., Youngstown, Ohio.	Mar. 6, 1889
COX, A. BEEKMAN	Cherry Valley, N. Y.	May 7, 1873
COXE, ECKLEY B.	Drifton, Luzerne Co., Pa.	Feb. 7, 1877
CRAIG, CHAMBERS M.	Ch. Eng. M. T. & M. R. R., Ala. Midland R. R., Montgomery, Ala.	Nov. 3, 1886
CRAIGHILL, WILLIAM PRICE	(Director.) Col. Corps of Eng. U. S. A., 9 Pleasant st., Baltimore, Md.	Oct. 7, 1885
CRANDALL, CHARLES L.	Assoc. Prof. of Civil Eng., Cornell University, Ithaca, N. Y. { J. June 7, 1876 M. Oct. 5, 1892	
CRAVEN, ALFRED	Div. Eng. New Croton Aqueduct, Carmel, N. Y.	Dec. 5, 1888
CRAWFORD, WILLIAM	Asst. Res. Eng. Sault Ste. Marie Canal, Sault Ste. Marie, Ontario, Canada.	Nov. 7, 1888
CROES, J. JAMES R.	Cons. Eng., 13 William st., New York City.	Dec. 4, 1867
CROSBY, BEN. L.	Res. Eng. Bellefontaine Bridge, 1409 N. Park pl., St. Louis, Mo. { J. June 2, 1880 M. Oct. 6, 1886	

Name.	Address.	Date of Membership.
CROSBY, HORACE	Eng. of Sewers, New Rochelle, N. Y.	Feb. 17, 1869
CROSBY, WILSON	125 Hammond st., Bangor, Maine.	Sept. 15, 1869
CROWELL, FOSTER	Cons. Eng., 18 Broadway, New York City.	Dec. 1, 1880
CULYER, JOHN Y.	Civil Eng. and Landscape Architect, Potter Bldg., Park Row and Beekman st., New York City.	Feb. 17, 1869
CUNNINGHAM, DAVID W.	Grandin, Cass Co., North Dakota.	May 7, 1873
CUNNINGHAM, JAMES H.	4 Magdala Crescent, Edinburgh, Scotland.	Aug. 6, 1879
CURRIE, DANIEL MCN.	U. S. Asst. Eng., Room 428 Custom House, St. Louis, Mo.	May 5, 1880
CURTIS, FAYETTE S.	Ch. Eng., New York, New Haven & Hartford R. R., New Haven, Conn.	April 3, 1889
CURTIS, W. G.	Asst. to Gen. Man. and Eng., Maint. Way Southern Pacific Company, San Francisco, Cal.	May 3, 1882
CURTIS, WENDELL R.	Civil Eng., Savannah, Ga. { J.	March 3, 1875
	{ M.	June 4, 1884
CURTIS, W. W.	Western Rep. The Pittsburgh Bridge Co., 1105 Owings Bldg., Chicago, Ill.	Sept. 5, 1888
CUTSHAW, W. E.	City Eng., Richmond, Va.	March 4, 1891
DAGRON, JAMES G.	Eng. Bridges, Baltimore & Ohio R. R., Baltimore, Md.	Oct. 6, 1886
DANFORTH, FREDERIC	Ch. Eng. Portland & Rumford Falls Ry., Gardiner, Me.	Sept. 2, 1891
DARLINGTON, FRANK G.	Supt. Indianapolis Div. P. C. C. & St. L. Ry., Indianapolis, Ind. { J.	Feb. 6, 1884
	{ M.	April 6, 1887
DARRACH, CHARLES G.	(Civil and Hydr. Eng., Wilson Bros. & Co.), Drexel Bldg., Philadelphia, Pa.	Jan. 5, 1876
DAVIS, CHARLES	County Eng., Pittsburgh, Pa. (72 Western ave., Allegheny City, Pa.)	Sept. 15, 1869
DAVIS, CHARLES E. L. B.	Maj. Corp. of Eng. U. S. A., 601 18th st., N. W., Washington, D. C.	July 12, 1877
DAVIS, CHESTER B.	Cons. Eng., 1627 Monadnock Bldg., (Residence 3762 Lake st.), Chicago, Ill.	Feb. 1, 1882
DAVIS, FRANK P.	Div. Eng. in charge Nicaragua Canal, and Man. U. S. Mail Steam Navigation and Trading Co., San Juan del Norte, Nicaragua.	Feb. 1, 1888
DAVIS, JOSEPH P.	Cons. Eng., 113 West 38th st., New York City.	Jan. 29, 1868

Name.	Address.	Date of Membership.	
DAVIS, ROB B.	Man. Bridge and Constr. Dept., Pencoyd Iron Works, Pencoyd, Pa.	July	3, 1889
DAVISON, GEORGE S.	(Wilkins & Davison, Civil Engs.), Westinghouse Bldg., Pittsburgh, Pa.	April	2, 1890
DAWLEY, EDWIN P.	Div. Eng. Prov. & Wore. Divs. N. Y., N. H. & H. R. R., Providence, R. I.	April	1, 1885
DEANS, JOHN STERLING	Prin. Asst. Eng., The Phoenix Bridge Co., Phoenixville, Pa.	May	4, 1887
DECOURCY, BOLTON W.	City Eng., Ocosta, Wash.	Nov.	6, 1889
DEEN, J. W.	Div. Eng. D. & R. G. R. R., Salida, Colo.	Jan.	6, 1892
DEFREES, MORRIS M.	62 Ingalls Block, Indianapolis, Ind.	March	3, 1880
DEFUNIAK, FREDERICK	Cons. Eng. and Ry. Expert, 204 East Chestnut st., Louisville, Ky.	May	7, 1873
DELAFIELD, CLARENCE	2 Wall st., New York City.	Feb.	1, 1888
DEMPSTER, ALEXANDER	Stanton and Euclid sts., Pittsburgh, Pa.	Nov.	5, 1879
DENNIS, WILLIAM F.	(Eggleston & Dennis, Civil Engs.), Shafer Bldg., Richmond, Va.	Feb.	1, 1888
DENTON, JAMES E.	Prof. Experimental Mechanics and Supt. Dept. of Tests, Stevens' Institute, Hoboken, N. J.	Sept.	7, 1892
DERRICK, HENRY C.	Houston, Halifax Co., Va.	Oct.	5, 1887
DEVIN, GEORGE	Ch. Eng. Pottsville Bridge Co., Pottsville, Pa.	Sept.	7, 1887
DEYO, S. L. F.	Div. Eng. New York, New Haven & Hartford R. R., 10 East 119th st., New York City.	June	6, 1888
DICKINSON, POMEROY P.	Ch. Eng. N. Y. & L. I. R. R. and Mass. So. Cons. Co., 45 Broadway, New York City.	Jan.	17, 1872
DIDIER, PAUL	Ch. Eng. Pittsburgh & Western Ry., Allegheny, Pa.	March	6, 1889
DILLMAN, GEORGE L.	Eng. Portland Cons. Co., Portland, Ore.	March	4, 1891
D'INVILLIERS, CAMILLE S.	Eng. of Cons. P. R. R., Philadelphia, Pa.	Jan.	4, 1888
DOANE, EDWIN A.	Cons. Eng. and Real Estate Broker, 27½ Whitehall st., Atlanta, Ga.	June	7, 1876
DOANE, THOMAS	Civil and Cons. Eng., 8 Pearl st., Charlestown, Mass.	June	7, 1882
DOANE, WALTER A.	Prin. Asst. Eng. Ohio Extension, Norfolk & Western R.R., Kenova, W. Va.	Sept.	7, 1881
DODGE, JOSEPH T.	340 W. Washington ave., Madison, Wis.	April	6, 1887
DONOVAN, JOHN J.	Ch. Eng. B. B. & Eastern R. R., Fairhaven, Wash.	J. April	7, 1886
		M. April	4, 1888

Name.	Address.	Date of Membership.	
DORAN, FRANK C.	Eng. and Gen. Road Mast. C. & W. I. R. R. and the Belt Ry. of Chicago, Chicago, Ill.	Sept.	5, 1883
DORSEY, EDWARD BATES	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	June	4, 1879
DOUGLAS, BENJAMIN	Bridge Eng. Mich. Cent. R. R., { J. Detroit, Mich. { M.	June	1, 1887
DOUGLAS, HENRY T.	Ch. Eng. Baltimore & Ohio R. R., 1113 N. Charles st., Baltimore, Md.	Jan.	2, 1890
DOWNE, GEORGE	Supt. Motive Power New South Wales Govt. Steam Tramways, Randwick, Sydney, New South Wales, Australia.	July	6, 1887
DRAKE, WILLIAM A.	Pueblo, Colo.	Sept.	5, 1883
DUANE, JAMES	Eng. in charge of laying Croton Pipes, 31 Chambers st. (Residence 589 E. 134th st.), New York City.	Dec.	5, 1883
DUBARRY, JOSEPH N.	Second Vice-Pres. Penn. R. R., 233 South 4th st., Philadelphia, Pa.	March	2, 1892
DUBOIS, A. JAY	Prof. of Civil Eng., Sheffield { J. Scientific School of Yale Col- { M. lege, New Haven, Conn.	Jan.	6, 1875
DUDLEY, CHARLES B.	Chemist P. R. R., 1219 Twelfth ave., Altoona, Pa.	July	7, 1875
DUN, JAMES	Ch. Eng. A. T. & S. F. R. R., Topeka, Kans.	Oct.	5, 1892
DUNCKLEE, JOHN B.	Asst. Eng., Potomac River Improve- ment, 601 18th st., N. W., Wash- ington, D. C.	March	2, 1892
DUNHAM, H. F.	(Dunham & Paine, Civil Eugs.), 150 Broadway, New York City, and City Hall Bldg., Cleveland, Ohio.	June	7, 1876
DUNLAP, DE CLERMONT	Asst. Ch. Eng. Sanitary Dist., 526 Rialto Bldg., Chicago, Ill.	April	2, 1873
DUNN, DANIEL BURKE	Ch. Eng. Macon, Dublin & Savannah R. R., Macon, Ga.	Oct.	1, 1890
DURHAM, C. WHEELER	Pres. and Gen. Man. The Durham House Drainage Co. of New York, 158 and 160 West 27th st., New York City.	Jan.	4, 1888
EARLEY, JOHN E.	Civil Eng., Colonia de Arquitectos, Calle Sur 24, No. 818, Mexico, Mexico.	Dec.	2, 1891
EATON, FREDERICK	City Eng., Los Angeles, Cal.	April	4, 1877
EAYRS, NORMAN W.	Supt. Structure Terminal R. R. Assocn., St. Louis, Mo.	May	5, 1886
		June	3, 1885

Name.	Address.	Date of Membership.
ECKART, WILLIAM R.	Mech. Eng. (P. O. Box 1844), 217 Sansome st., Rooms 2 and 3, San Francisco, Cal.	Jan. 5, 1881
ECKERT, EDWARD W.	1313 Monadnock Bldg., Chicago, Ill.	Feb. 3, 1886
EDWARDS, HARRY W.	Eng. Main. Way Western Div. G. N. Ry., Spokane, Wash.	June 4, 1890
EDWARDS, NATHANIEL M.	(Edwards & Orbison, Hydraulic and Civil Engs.), Appleton, Wis.	June 14, 1874
EGGLESTON, T. C.	(Eggleston and Dennis), P. O. Box 186, Richmond, Va.	Dec. 7, 1887
EGLESTON, THOMAS	Prof. School of Mines, Columbia College, 35 West Washington sq., New York City.	March 5, 1879
ELLIOT, CHARLES D.	Somerville, Mass.	Aug. 7, 1872
ELLIOTT, CHARLES GLEASON	Civil Eng., Normal, Ill.	Sept. 3, 1890
ELLIS, S. CLARENCE	Ch. Eng. Board of Survey, 328 Exchange Bldg., Boston, Mass.	Aug. 7, 1872
ELMER, HOWARD NIXON	Man. Western Office, New Jersey Steel and Iron Co., St. Paul, Minn.; Chicago Office, 616 Phenix Bldg., Chicago, Ill.	April 7, 1886
ELWELL, CHARLES C.	Div. Eng. Main. Way, B. & O. R. R., Pittsburgh, Pa.	July 1, 1891
ELY, THEODORE N.	(Director.) Gen. Supt. Motive Power Penn. R. R., Altoona, Pa.	March 2, 1881
EMERSON, GEORGE D.	Roseburgh, Oregon.	Sept. 18, 1872
EMERY, CHARLES E.	Cons. Eng., 915 Bennett Bldg., New York City.	May 6, 1874
ENDICOTT, MORDECAI T.	Civil Eng. Bureau of Yards and Docks, U. S. Navy Dept., Washington, D. C.	April 7, 1877
ENGLE, ROBERT L.	736 Westminster ave., Cincinnati, Ohio.	Sept. 7, 1881
ERNST, OSWALD H.	Col. U. S. A., War Dept., Washington, D. C.	July 4, 1888
EVANS, GEORGE E.	Civil and Hydr. Eng., 95 Milk st., Boston, Mass.	May 2, 1888
EVANS, LOUIS H.	Div. Eng. Chicago & Northwestern Ry., Chicago, Ill.	July 3, 1889
EVANS, LOUIS P.	(Cofrode & Evans, Engs. and Contractors), S. E. cor. 4th and Walnut sts., Philadelphia, Pa.	Sept. 3, 1884
FAIRLEIGH, JAMES A.	Ch. Eng. East Tenn. Land Co., Harriman, Tenn.	Sept. 2, 1891
FANNING, JOHN T.	Cons. Eng. Kasota Block, Minneapolis, Minn.	Aug. 7, 1872

Name.	Address.	Date of Membership.	
FARLEY, GEORGE M.	Supervisor Penna. Co., New { J. Brighton, Pa. { M.	April 6, 1887	Jan. 2, 1890
FARNUM, HENRY H.	Eng. of Sewers, District North of Harlem River, 2622 Third ave., New York City.	July 1, 1891	
FAVA, FRANCIS R., Jr.	Loan and Trust Co. Bldg., Room 99, Washington, D. C.	Nov. 5, 1890	
FEIND, BERNHARD	Civil and Hydr. Eng., 1105-7 The Rookery, Chicago, Ill.	Jan. 2, 1890	
FELTON, HERBERT C.	Supt. Delaware River Ferry Co. of N. J., Camden, N. J.	June 1, 1887	
FELTON, SAMUEL M.	Pres. C. N. O. & T. P. Ry., Ala., Gt. Southern and Louisville Southern R. Rs., St. Paul Bldg., Cincinnati, Ohio.	Jan. 4, 1882	
FERGUSON, JOHN W.	Eng. and Builder, Paterson Nat. Bank Bldg., Paterson, N. J. { J. { M.	Feb. 2, 1881	Feb. 2, 1887
FERRY, CHARLES A.	33 Edgewood ave., New Haven, Conn. { J. { M.	May 4, 1881	Jan. 2, 1889
FIELD, BURR K.	Vice-Pres. The Berlin Iron Bridge Co., Berlin, Conn.	Oct. 1, 1884	
FIELD, GEORGE S.	452 Delaware ave., Buffalo, N. Y.	April 7, 1880	
FIELDS, SAMUEL J.	Eng. for Dwyer & Huntington, 564 Ellicott st., Buffalo, N. Y.	March 5, 1884	
FIESER, L. F.	114 Lexington ave., Columbus, Ohio.	Jan. 2, 1890	
FILLEY, HIEL H.	Ch. Eng. Mex. Nat. Cons. Co., Calle de Ortega 28, Mexico, Mex.	Jan. 3, 1883	
FINK, ALBERT	(Past - President.) Civil Eng., Louisville, Ky.	July 20, 1870	
FINK, RUDOLPH	Pres. and Gen. Man. Little Rock & Memphis R. R., Little Rock, Ark.	Sept. 21, 1870	
FINNEY, FREDERICK N.	Milwaukee, Wis.	Sept. 3, 1879	
FIRMSTONE, FRANK	Easton, Pa.	Aug. 7, 1878	
FISHER, CLARK	Fisher Rail-Joint Works, Trenton, N. J.	Oct. 19, 1870	
FISHER, EDWIN A.	Supt. Pittsburgh Div. Western New York & Penn. R. R., 294 Troup st., Rochester, N. Y.	July 4, 1888	
FISHER, FRANCIS D.	Supt. Brooklyn Elevated R. R., (Residence 76 St. James pl.), Brooklyn, N. Y.	May 2, 1888	
FITCH, ASA B.	1304 South 6th st., Terre Haute, Ind.	May 5, 1884	
FITZGERALD, DESMOND	(Director.) Res. Eng. Additional Supply Boston Water Works, Brookline, Mass.	Sept. 3, 1884	
FITZGERALD, J. LELAND	Sanitary and Hydr. Eng., Schenectady, N. Y.	Jan. 2, 1889	

Name.	Address.	Date of Membership.	
FITZHUGH, G. D.	Cons. and Examining Eng., Birmingham, Ala.	May	6, 1891
FLAD, EDWARD	Civil and Mech. Eng., 118 { J. Jan. 7, 1885 Laclede Bldg., St. Louis, Mo. { M. Feb. 1, 1888		
FLAD, HENRY	(Past-President.) Member Miss. River Comm., 3400 Franklin ave., St. Louis, Mo.	Feb.	15, 1871
FLAGG, J. FOSTER	195½ Sixth ave., Brooklyn, N. Y.	Oct.	7, 1874
FLEMING, SANDFORD	Ottawa, Canada.	Sept.	18, 1872
FLYNN, PATRICK J.	Cons. Eng., 118 S. Hill st. (Box 916), Los Angeles, Cal.	Feb.	4, 1891
FOOTE, ARTHUR DE WINT	Boisé City, Idaho.	May	7, 1884
FORCE, CYRUS G.	Ch. Eng. Dept. Public Works, Cleveland, Ohio.	Feb.	6, 1878
FORD, PORTER D.	Ch. Eng. Long Island R. R., Long Island City, N. Y.	March	5, 1890
FORNEY, MATTHIAS N.	17 East 38th st., New York City.	Sept.	6, 1871
FORSYTH, ROBERT	Ch. Eng. Illinois Steel Co., 1035 Rookery Bldg., Chicago, Ill.	May	12, 1875
FOSTER, WILBUR F.	Eng. and Contractor, 3 Berry Block, Nashville, Tenn.	May	7, 1873
FOUQUET, JOHN DOUGLAS	Architect, N. Y. C. & H. R. R. R., Room 48, Grand Central Station, New York City.	June	3, 1885
FOX, S. WATERS	Div. Eng. to Missouri River { J. July 7, 1880 Comm. (P. O. Box 954), St. { M. Oct. 6, 1886 Joseph, Mo.		
FRANCIS, CHARLES	Commr. of Public Works, Daven- port, Iowa.	May	4, 1892
FRANCIS, GEORGE B.	Res. Eng. New York, Provi- dence & Boston and O. C. { J. Sept. 5, 1883 R.R. Term. Co., Providence, { M. Nov. 7, 1888 R. I.		
FRANCIS, HENRY N.	Asst. Eng., City Eng.'s Office, } J. March 1, 1876 Providence, R. I. { M. Nov. 7, 1888		
FRANKLIN, WILLIAM B.	Hartford, Conn.	April	1, 1874
FRAZIER, HARRY	Ch. Eng. Chesapeake & Ohio Ry., Richmond, Va.	May	1, 1889
FRAZIER, JAMES LEWIS	Div. Supt. Southern Pacific Co., Fresno, Cal.	Sept.	1, 1880
FREEMAN, JOHN R.	Eng. and Asst. Ch. of Inspn. { Dept. Asso. Factory Ins. { J. June 7, 1882 Cos., 31 Milk st., Room 55, { M. April 3, 1889 Boston, Mass.		
FRITH, ARTHUR J.	21 East 46th st., New York City.	Jan.	3, 1883
FRIZELL, JOSEPH P.	Civil Eng., 60 Congress st., Boston, Mass.	Jan.	3, 1883

Name.	Address.	Date of Membership.	
FTELEY, ALPHONSE	Ch. Eng. Aqueduct Commission, 213 Stewart Bldg., New York City.	Jan.	5, 1876
FUERTES, ESTEVAN A.	(Director.) Director College of Civil Engineering, Cornell Uni- versity, Ithaca, N. Y.	Feb.	17, 1869
FULLER, EUGENE F.	Hydr. Eng., 11 Wall st., New York City.	May	5, 1886
FULLER, FRANKLIN I.	Gen. Man. Portland Cable Ry., Portland, Oregon.	Jan.	6, 1886
FULLER, FRANK L.	Civil Eng., 12 Pearl st., Boston, { J. Mass. { M.	April	4, 1883
FULTON, JOHN A.	4146 Berkley ave., Chicago, Ill.	April	4, 1888
		May	4, 1887
GAMBLE, FRANCIS C.	Res. Eng. in British Columbia, Dept. Public Works of Canada, Victoria, B. C.	April	1, 1891
GARDINER, EDMUND LE BRETON	Eng. Dundee Water Power Co., Passaic, N. J.	June	7, 1882
GARDNER, G. CLINTON	Gen. Man. Ohio River R.R., Parkers- burg, West Va.	Nov.	3, 1875
GATCHELL, GEORGE S.	Commr. Public Works and Man. Elevating Co., Buffalo, N. Y.	May	7, 1884
GATES, CHRISTOPHER L.	Eng. Toledo Bridge Co., { J. Toledo, Ohio. { M.	Dec.	4, 1878
		Sept.	5, 1883
GATES, HORACE D.	Dep. City Eng., 311 Lyon st., San Francisco, Cal.	March	7, 1883
GAY, CHARLES W.	City Eng., City Hall, Lynn, Mass.	May	6, 1891
GAY, MARTIN	Asst. Eng. Dept. Public Works and Parks, New York { J. City. (Address: West New { M. Brighton, N. Y.)	June	4, 1884
		June	5, 1889
GAYLER, CARL	Bridge Eng., City Hall, St. Louis, Mo.	Sept.	3, 1884
GAYOL, ROBERTO	P. O. Box 766, Mexico, Mexico.	March	2, 1892
GEDDES, JAMES K.	Gen. Man. and Ch. Eng. The Bel- laire, Zanesville & Cincinnati Ry., Zanesville, Ohio.	Jan.	2, 1890
GELETTE, WILLIAM D.	(Care Ch. Eng. Southern Pacific Co.) cor. 4th and Townsend sts. San Francisco, Cal.	April	1, 1885
GERBER, EMIL	Civil Eng., (Care George S. Mori- son), 800 The Temple, Chicago, Ill.	Feb.	1, 1888
GERMANN, FRANZ	(Care Chunchasmayo Gold Placer Co.), Puno, Peru.	April	3, 1889
GIAVER, JOACHIM G.	Asst. Eng. Cons. World's Columbian Exposition, Chicago, Ill.	July	3, 1889

Name.	Address.	Date of Membership.	
GIBBS, CHARLES W.	Ch. Eng. Rio Grande Southern R. R., Ridgway, Colo.	Jan.	2, 1889
GIELOW, HENRY J.	Eng. and Naval Architect, 29 Broadway, New York City.	Dec.	6, 1882
GILBERT, CHARLES PHELPS	Sec. and Gen. Man. Edison Illuminating Co., Detroit, Mich.	Feb.	6, 1878
GILES, ROBERT	North Topeka, Kans.	May	6, 1891
GILLETTE, EDWARD, Jr.	(Care B. & M. Engineer Office), Lincoln, Neb.	July	3, 1889
GILLHAM, ROBERT	Cons. Eng., Rialto Bldg., Kansas City, Mo.	June	2, 1886
GLADDING, HENRY H.	30 Stanley st., New Haven, Conn.	{ J. July M. Jan.	{ 1, 1885 4, 1888
GLOVER, OLIVER L.	La Union, Salvador, Central America.	April	3, 1878
GOAD, CHARLES E.	185 St. James st., Montreal; 2 Toronto st., Toronto, Canada; and 53 New Broad st., London, E. C., England.	Sept.	7, 1881
GOLAY, PHILIP	Asst. U. S. Eng. in chg. Locks and Dams, Monongahela River, Morgantown, W. Va.	Sept.	5, 1877
GOLDMARK, HENRY	Civil Eng., 611 Phenix Bldg., Chicago, Ill.	{ J. May M. June	{ 7, 1884 6, 1888
GOODRICH, WILBUR F.	Asst. Eng. Met. Sewerage Comm., 10 Gibbens st., Somerville, Mass.	May	4, 1887
GOODWIN, H. STANLEY	Gen. Eastern Supt. Eastern Div. P. & R. R.R., South Bethlehem, Pa.	July	20, 1870
GOTTLIEB, ABRAHAM	(Director.) Major Block, Room 75, Chicago, Ill.	Sept.	4, 1872
GORDON, ROBERT	(Care H. S. King & Co.), 45 Pall Mall, London, England.	Feb.	4, 1882
GOULD, E. SHERMAN	Cons. Eng. Vento Water Works, Havana, Cuba. (Address: Care Runkle, Smith & Co., 15 Wall st., New York City.)	Nov.	4, 1885
GOULD, WILLIAM T.	Asst. Eng. Wiggins Ferry Co., Republic Bldg., St. Louis, Mo.	Jan.	2, 1890
GOWEN, CHARLES SEWALL	Div. Eng. Aqueduct Com., Sing Sing, N. Y.	March	7, 1888
GRAHAM, CHARLES H.	Asst. Eng. Department Public Parks, 64th st., and 5th ave. (Residence, 445 East 117th st.), New York City.	Sept.	7, 1887
GRANT, EMERSON W.	Res. Eng. N. M. Div. A. T. & S. F. R. R., Box 133, East Las Vegas, N. M.	Dec.	4, 1889

Name.	Address.	Date of Membership.
GRANT, J. HERBERT	Rochester, N. Y.	March 2, 1892
GRANT, WILLIAM H.	122 West 88th st., New York City.	July 2, 1873
GRAY, GEORGE E.	Civil Eng., 1115 Bush st., San Francisco, Cal.	July 2, 1873
GRAY, SAMUEL M.	(Vice-President.) Cons. Eng., 20 Market sq., Room 37, Providence, R. I.	May 15, 1872
GREEN, BERNARD R.	Supt. and Eng. Bldg. for Library of Congress, Washington, D. C.	Oct. 2, 1889
GREENE, BENJAMIN D.	40 East 26th st., New York City.	Nov. 4, 1885
GREENE, CHARLES E.	Prof. of Civil Engineering University of Michigan, Ann Arbor, Mich.	Jan. 4, 1882
GREENE, DAVID M.	41 First st., Troy, N. Y.	May 20, 1868
GREENE, EDWARD A.	317 N. Washington st., Alexandria, Va.	July 4, 1888
GREENE, FRANCIS VINTON	Pres. The Barber Asphalt Paving Co., 1 Broadway, New York City.	June 3, 1885
GREENE, GEO. S., Jr.	Eng. in chf. Department of Docks, Pier A, Battery place, New York City.	Dec. 4, 1867
GREENE, JOSEPH N.	Ch. Eng., Maine Shore Line, R. R., Bangor, Me.	Oct. 5, 1887
GREENOUGH, MALCOLM S.	Vice-Pres. and Gen. Man. Cleveland Gas Light & Coke Co., Cleveland, Ohio.	Dec. 4, 1878
GREINER, JOHN E.	Phila. Bridge Works, Pottstown, Pa.	June 4, 1890
GRIMM, CARL R.	Eng. Tacony Iron and Metal Co., Tacony, Philadelphia, Pa.	June 4, 1890
GRIMSHAW, J. WALTER	Australian Club, Sidney, New South Wales, Australia.	Nov. 7, 1888
GRISWOLD, FRANK L.	Cons. Eng., Casilla 738, Buenos Ayres, Argentine Republic.	May 2, 1883
GUNNELL, WILLIAM C.	600 20th st., Washington, D. C.	Feb. 7, 1877
GUTHRIE, EDWARD B.	Deputy Eng. Dept. Public Works, Buffalo, N. Y.	Sept. 3, 1884
		{ M. Oct. 5, 1887
GZOWSKI, Sir CASIMIR S.	The Hall, Toronto, Canada.	Dec. 2, 1868
HAGUE, CHARLES A.	86 Liberty st., New York City.	Feb. 3, 1892
HAIGHT, STEPHEN S.	City Surveyor and Civil Eng., West Farms, New York City.	June 1, 1881
HAINES, CASPAR W.	Cheltenham, Pa.	{ J. Feb. 2, 1876
		{ M. Oct. 7, 1891
HAINES, H. S.	Vice-Pres. Plant System, 12 West 23d st., New York City.	Nov. 2, 1887
HAINS, PETER C.	Lt.-Col. Corps of Eng., U. S. A., Portland, Me.	April 2, 1890

Name.	Address.	Date of Membership.
HALE, RICHARD A.	Prin. Asst. Eng. Essex Co., { J. Lawrence, Mass. { M.	Feb. 6, 1884 July 1, 1891
HALL, JULIEN A.	Eng. for Grant Wilkins, Morotock P. O., Pittsylvania Co., Va.	June 5, 1889
HALL, WILLIAM HAMMOND	Cons. Civil Eng., Room 29, New Mercantile Library Bldg., San Francisco, Cal.	Jan. 2, 1884
HAMBLETON, FRANCIS H.	Cons. Eng., 8 South st., Baltimore, Md.	March 5, 1873
HAMILTON, WILLIAM G.	105 East 21st st., New York City.	Oct. 7, 1868
HANDY, EDWARD A.	Ch. Eng. Lake Shore & Michigan Southern Ry., Cleveland, Ohio.	Jan. 2, 1889
HANNAFORD, EDMUND P.	Ch. Eng. Grand Trunk R. R., Montreal, Canada.	Sept. 18, 1872
HARDING, GEORGE EDWARD	Architect and Civil Eng., 40 Exchange pl., New York City.	March 3, 1875
HARDING, HENRY	Civil and Hydr. Eng., Bridgeport, Conn.	May 7, 1873
HARDY, GEORGE R.	Asst. Man. United Elec. Light & Power Co., Times Bldg., New York City.	Nov. 7, 1888 Nov. 4, 1891
HARING, JAMES SMITH	Suffern, Rockland Co., N. Y.	
HARISON, R. MORLEY	228 West Regent st., Glasgow, Scotland.	May 6, 1885
HARLOW, JAMES H.	Eng. and Contractor, 108 4th ave., Pittsburgh, Pa.	March 4, 1874
HARLOWE, CHARLES	Box 35, Centralia, Wash.	Sept. 7, 1887
HARRIS, ROBERT L.	Cons. Eng., 1 Broadway, New York City.	May 3, 1876
HARRIS, WILLIAM P.	Johnson City, Tenn.	June 1, 1881
HARRISON, EDLOW W.	Rooms 23-26, Fuller Bldg., Jersey City, N. J.	June 3, 1885
HARROD, BENJAMIN M.	(Director.) 19 Masonic Bldg., New Orleans, La.	April 7, 1877
HASELL, BENTLEY D.	Railway Com. Merchant and Manufacturers' Agent; Sec. and Treas. Coastwise S. S. Assoc'n, 66 Pine st., New York City. (Residence, Brooklyn, N. Y.)	July 3, 1878
HASKELL, C. F. B.	Wenatchee, Wash.	Oct. 7, 1891
HASKINS, WILLIAM J.	Asst. Eng. C. W. Hunt Co., { 45 Broadway, (Residence, 41 { J. West 105th st.), New York { M. City.	March 7, 1883 Dec. 1, 1886
HASWELL, CHARLES H.	Civil, Mech. and Cons. Eng. and City Surveyor, 42 Broadway, New York City.	Jan. 29, 1868

Name.	Address.	Date of Membership.	
HATCH, FREDERICK T.	Eng. Main. Way P. C. C. & St. L. Ry., Pittsburgh, Pa.	Dec.	4, 1889
HAUPT, LEWIS M.	Cons. Eng., 107 North 35th st., Philadelphia, Pa.	June	6, 1888
HAVEN, WILLIAM A.	Ch. Eng. Helena & Castle Ry., P. O. Box 405, Helena, Montana.	March	5, 1873
HAVILAND, ARTHUR	Room 9, Grand Central Station, New York City.	J.	Jan. 4, 1882
		M.	Jan. 4, 1888
HAWKS, JAMES D.	Ch. Eng. Michigan Central R. R., Detroit, Mich.	Dec.	3, 1884
HAYES, EDMUND	Union Bridge Co., 24 Haven Bldg., Buffalo, N. Y.	J.	March 6, 1878
		M.	March 5, 1884
HAYES, R. SOMERS	32 Nassau st. (Residence, 39 West 38th st.), New York City.	Sept.	6, 1882
HAZELTON, CHARLES W.	Eng. and Treas. Turner's Falls Water Power Co., Turner's Falls, Mass.	Jan.	7, 1891
HAZLEHURST, GEORGE B.	1215 N. Charles st., Baltimore, Md.	Feb.	1, 1888
HEALD, SIMPSON C.	South Framingham, Mass.	Nov.	4, 1885
HEGEMAN, WILLIAM W.	50 Broadway, New York City.	Feb.	6, 1884
HENDERSON, JOHN BAILLIE	Govt. Hydr. Eng. Brisbane, Queensland, Australia.	June	4, 1890
HENNING, CHARLES S.	Pres. Cherokee Coal Mining Co., Cherokee, Kans.	Jan.	7, 1885
HENNY, DAVID C.	Eng. Excelsior Redwood Co., 4th and Channel sts., San Francisco, Cal.	Sept.	7, 1887
HENRY, D. FARRAND	Detroit, Mich.	July	7, 1875
HENTHORN, JOHN T.	(Remington & Henthorn, Cons. Engs.), 146 Westminster st., Providence, R. I.	Dec.	3, 1884
HERBERT, ARTHUR P.	Eng. and Supt. Colima Div. Mex. Nat. Cons. Co., Colima, Mexico.	Sept.	5, 1888
HERING, RUDOLPH	Civil and Sanitary Eng., 277 Pearl st., New York City.	Jan.	5, 1876
HERMANN, EDWARD A.	Asst. Eng. Street Comm. Dept., 2608 Lafayette ave., St. Louis, Mo.	April	6, 1887
HERMANY, CHARLES	Ch. Eng. and Supt. Water Works, 549 3d st., Louisville, Ky.	Jan.	6, 1869
HERRICK, HENRY A.	55 Gardner st., Pawtucket, R. I.	May	7, 1890
HERSCHEL, CLEMENS	Eng. and Supt. East Jersey Water Co., 2 Wall st., New York City.	April	21, 1869
HEUER, WILLIAM H.	Major Corps Engs., U. S. A., Room 89, Flood Bldg., San Francisco, Cal.	March	3, 1880

Name.	Address.	Date of Membership.	
HEWITT, CHARLES E.	Eng. N. J. Steel and Iron Co., Trenton, N. J.	Oct.	5, 1887
HIDER, ARTHUR	U. S. Asst. Eng., Res. Eng. in local charge of improvements Lake Providence Reach, Miss. River, Greenville, Miss.	Sept.	7, 1881
HILBERT, HELIODORE J.	Civil Eng., 335 National ave., Mil- waukee, Wis.	April	1, 1885
HILGARD, K. EMIL	Eng. Bridges, N. P. R. R., Grand Central Pass. Station, Chicago, Ill.	June	4, 1890
HILL, ALBERT B.	(Director.) Cons. Eng., 82 Church st., New Haven, Conn.	{ J. Feb. 2, 1876 M. March 5, 1884	
HILL, JOHN W.	Cons. Eng. Water Works and Sewerage, Glenn Bldg., Rooms 21-22, Cincinnati, O.	{ J. Feb. 3, 1875 M. April 5, 1876	
HILL, WARREN E.	Vice-Pres. The Continental Iron Works, Brooklyn, N. Y.	May	7, 1873
HILL, WILLIAM RYAN	Ch. Eng. Water Board, Syracuse, N. Y.	July	1, 1892
HILLMAN, CHARLES F.	Civil Eng., Box 185, Santiago, Chili.	July	5, 1876
HILLS, FRANCIS L.	Ch. Eng. W. & N. R. R., Wilming- ton, Del.	March	4, 1891
HILTON, GEORGE PORTER	Eng. Hilton Bridge Cons. Co., Albany, N. Y.	May	1, 1889
HINCKLEY, HOWARD V.	Office Eng. Atchison, Topeka & Santa Fé R. R., Topeka, Kansas.	Dec.	5, 1883
HINCKLEY, JOHN F.	Civil Eng. and Contractor, 2017 Rutgers st., St. Louis, Mo.	May	6, 1885
HOAG, SIDNEY W., Jr.	Asst. Eng. Dept. of Docks, 1718 Madison ave., New York City.	Sept.	2, 1885
HOBSON, JOSEPH	Ch. Eng. Great Western & Northern and Northwest Divs. Grand Trunk Ry., and Ch. Eng. St. Clair Tunnel Co., Hamilton, Canada.	Feb.	5, 1890
HODGDON, FRANK W.	Eng. Mass. Board Harbor and Land Commrs., 65 Bowdoin st., Boston, Mass.	Dec.	3, 1884
HODGES, ARTHUR	Civil Eng. and Contractor, 85 Water st., Boston, Mass. (P. O. Box 76, Newton Highlands, Mass.)	May	2, 1888
HODGES, GILBERT	Civil and Cons. Eng., 19 Exchange pl., Room 13, Boston, Mass.	June	4, 1890
HOFF, OLAF	Bridge Eng., 602 and 603 Oneida Block, Minneapolis, Minn.	May	6, 1885
HOLBROOK, FREDERICK W. D.	Sec. Board Public Works, P. O. Box 194, Seattle, Wash.	Oct.	6, 1886

Name.	Address.	Date of Membership.
HOLBROOK, HENRY R.	Ch. Eng. P. G. & P. R. R., Pueblo, Colo.	Jan. 2, 1890
HOLMAN, M. L.	Water Commr., 3744 Finney ave., St. Louis, Mo.	April 2, 1884
HOLT, HERBERT S.	Civil Eng., 20 St. Alexis st., Montreal, Canada.	March 6, 1889
HOOVER, JOSEPH W.	Eng. and Gen. Agt. Wrought-Iron Bridge Co., 835-837 N. Y. Life Bldg., Kansas City, Mo.	June 6, 1888
HOPKINS, CHARLES COMSTOCK	City Eng. and Member of The Stanwix Engineering Co., Rome, N. Y.	June 4, 1890
HORTON, HORACE E.	Pres. Chicago Bridge and Iron Co., Tracy P. O., Chicago, Ill.	Sept. 6, 1882
HOUSE, BRUCE F.	Civil Eng. Elec. L. & P. Co., 324 West 13th ave., Denver, Colo.	April 4, 1888
HOUSTON, JOHN	Arlington, N. J.	May 6, 1868
HOWARD, FREDERICK B.	Ch. Eng. Park and Boulevard Comm., 41 Newberry Bldg., Detroit, Mich.	March 3, 1875 Nov. 6, 1878
HOWE, EDWARD W.	Asst. Eng. in chg. Park Construction, City Engineer's Office, Boston, Mass.	Sept. 7, 1887
HOWE, MILTON G.	Receiver Houston, East & West Texas Ry., Houston, Tex.	Oct. 16, 1872
HOWELL, GEORGE W.	Commr. Passaic River Drainage and City Surveyor, Lock Box 164, Morristown, N. J.	May 2, 1888
HOWLAND, ARTHUR H.	Civil Eng., 125 Milk st., Boston, Mass.	June 2, 1886
HOXIE, R. L.	Capt. Corps of Engs., U. S. A., Willett's Point, Whitestone P. O., N. Y.	June 2, 1886
HOYT, WILLIAM E.	Ch. Eng. Buffalo, Rochester & Pittsburgh R. R., Rochester, N. Y.	March 5, 1884
HUDSON, JOHN R.	19 26th st., Chicago, Ill.	May 4, 1887
HUGHES, WILLIAM M.	City Bridge Eng., 62 City Hall, Chicago, Ill.	June 2, 1880
HUMPHREYS, DAVID C.	Prof. Applied Mathematics, Washington & Lee University, Lexington, Va.	Nov. 2, 1887
HUNT, ALFRED E.	Firm of Hunt & Clapp, Proprs. Pittsburgh Testing Laboratory, 116 Water st., Pittsburgh, Pa.	Sept. 1, 1886
HUNT, CHARLES WARREN	(Assistant Secretary.) 127 East 23d st. (Residence, 169 West 88th st.), New York City.	Jan. 2, 1884

Name,	Address,	Date of Membership.	
HUNT, CONWAY B.	Eng. Bridges District of Columbia, District Bldg. (Residence, 2015 N st. N. W.), Washington, D. C.	Feb.	4, 1891
HUNT, RANDELL	(Doe, Hunt & Co.) Engrs. and Bridge Contrs., 130 Sansome st., San Francisco, Cal.	May	2, 1883
HUNT, ROBERT W.	Cons. Eng., 1137 The Rookery, Chicago, Ill.	June	3, 1885
HUSON, HERBERT S.	Mayor of Tacoma, Tacoma, Wash.	June	2, 1886
HUTTON, WILLIAM RICH	Cons. Eng., 35 Broadway, New York City.	Jan.	8, 1873
IVES, CHAUNCEY	Ch. Eng. Cumberland Valley R. R., Chambersburg, Pa.	June	4, 1884
JACKMAN, HOWARD H.	715 Western ave., Topeka, Kans.	May	6, 1891
JACKSON, J. M.	Lemont, Cook Co., Ill.	Sept.	1, 1886
JACKSON, LEWIS B.	Hotel Brunswick, New York City.	June	6, 1888
JACKSON, THOMAS M.	Clarksburgh, W. Va.	June	3, 1891
JACKSON, WILLIAM	City Eng., City Hall, Boston, Mass.	Sept.	3, 1884
JAMESON, CHARLES D.	State Univ. of Iowa, Iowa City, Iowa.	March	7, 1888
JAMIESON, J. Q.	475 Hassalo st., Portland, Ore.	Nov.	6, 1889
JAQUES, W. H.	Ordinance Eng., The Bethlehem Iron Co., South Bethlehem, Pa.; Vice-Pres. Manhattan Brass Co., New York City.	July	2, 1890
JARDINE, A. WILLIAM	Brisbane, Queensland, Australia.	April	2, 1890
JARVIS, CHARLES M.	Pres. and Ch. Eng., The Berlin Iron Bridge Co., East Berlin, Conn.	Jan.	7, 1885
JAYCOX, THOMAS W.	P. O. Box 189, Leadville, Colo.	Jan.	4, 1882
JENKINS, WILLIAM DUNBAR	Receiver and Ch. Eng., New Orleans & Northwestern Ry., Natchez, Miss.	Sept.	7, 1887
JENNINGS, HENRY C.	Cons. and Contr. Eng., 611 People's Bank Bldg., Denver, Colo.	April	6, 1887
JENNINGS, W. H.	Eng. Main. Way Pittsburgh & Lake Erie R. R., Pittsburgh, Pa.	Sept.	5, 1883
JENNINGS, WILLIAM T.	Cons. Eng., 506 Board Trade Bldg., Toronto, Canada.	April	2, 1884
JEWETT, WILLIAM C.	Res. Eng., Cincinnati, New Orleans & Texas Pacific Ry., Chattanooga, Tenn.	June	3, 1885

Name.	Address.	Date of Membership.
JOHNSON, CHARLES R.	Pres. Johnson R. R. Signal Co., Rahway, N. J.	June 3, 1885
JOHNSON, JAMES M.	Pres. and Eng. Louisville Bridge & Iron Co., Louisville, Ky.	July 1, 1891
JOHNSON, JOHN B.	Prof. Civ. Eng., Washington, Univer- sity, St. Louis, Mo.	April 7, 1886
JOHNSON, LORENZO M.	Gen. Man. Mexican Interna- tional Ry., P. O. Box 109, { J. March 3, 1875 Eagle Pass, Texas. { M. April 7, 1880	
JOHNSON, PHELPS	Ch. Eng., Dominion Bridge Co. (Ltd.), 20 St. Alexis st., Montreal, Canada.	April 7, 1880 July 1, 1891
JOHNSON, THOMAS H.	Prin. Asst. Eng., P. C. C. & St. L. Ry., Pittsburgh, Pa.	Sept. 5, 1887
JOHNSTON, A. LANGSTAFF	Civil and Cons. Eng., 1105 East Main st., Richmond, Va.	June 4, 1890
JOHNSTON, HORACE G.	Gen. Man. Am. Well and Prospect- ing Co., Salina, Kans.	Sept. 7, 1887
JOHNSTON, J. HOWARD	Lima, Peru.	March 1, 1876
JONES, WASHINGTON	Cons. Mech. Eng., 1632 North 15th st., Philadelphia, Pa.	Oct. 7, 1874
JORDAN, EDWARD C.	Civil Eng., 31½ Exchange st., Port- land, Maine.	May 7, 1890
JUDSON, WILLIAM PIERSON	U. S. Asst. Eng., Oswego, N. Y.	Sept. 7, 1881
JUENGST, HENRY F.	Civil Eng. (Care St. Joseph Water Co.), St. Joseph, Mo.	April 2, 1884
JUST, GEORGE ALEXANDER	Civil Eng., (Lewinson & Just, { Cons. Engs. and Contract- { J. Sept. 3, 1884 ors), 90 Nassau st., New { M. March 4, 1891 York City. {	
KASTL, ALEX. EDWARD	Asst. Eng. Sanitary District, { 526 Rialto Bldg., Chicago, { J. Jan. 4, 1888 Ill. { M. Nov. 5, 1890	
KATTÉ, WALTER	Ch. Eng. New York Central & Hud- son River R. R. and West Shore R. R., Room 48, Grand Central Station, (Residence, 523 Madison ave.), New York City.	Oct. 7, 1869
KAUFMAN, GUSTAVE	Bridge Eng., 813 Hamilton Bldg., Pittsburgh, Pa.	May 7, 1890
KEATING, EDWARD H.	City Eng., Toronto, Ont., Canada.	June 7, 1882
KEEFER, GEORGE A.	Victoria, British Columbia.	Jan. 2, 1889
KEEFER, THOMAS C.	(Past-President.) Ottawa, Canada.	April 4, 1877
KEITH, GEORGE T.	Ch. Eng. Montreal Water & Power Co., Box 921, Montreal, Canada.	May 4, 1881

Name.	Address.	Date of Membership.	
KEITH, HERBERT C.	Bridge Asst. Eng. N. Y. & N. E. R. R., 180 Summer st., Boston, Mass.	Dec.	4, 1889
KELLEY, HOWARD G.	Res. Eng. and Supt. Bridges and Bldgs. St. Louis Southwestern Ry. & St. Louis Southwestern Ry. of Texas, Texarkana, Texas.	May	1, 1889
KELLEY, WILLIAM D., Jr.	Eng. in chg. 3d Corps Interconti- nental Ry. Comm., 1016 Vermont ave., Washington, D. C.	Nov.	2, 1887
KELLOGG, CHARLES	Pres. Elmira Bridge Co. (Ltd.), Athens, Pa.	June	2, 1880
KELLY, CASSIUS W.	First Asst. City Eng., 18 City { J. Hall, New Haven, Conn. { M.	March	1, 1882
KELLY, JOHN P.	Div. Eng. N. Y. State Canals, 2637 Fifth ave., Troy, N. Y.	June	6, 1888
KENDRICK, JOHN W.	Ch. Eng. Northern Pacific R. R., Chicago, Ill.	March	7, 1890
KENLY, WILLIAM W.	Ch. Eng. Northern Pacific R. R., Chicago, Ill.	June	6, 1883
KENLY, WILLIAM W.	Eng. Constr. Edge Moore Bridge Works, Wilmington, Del.	Nov.	6, 1889
KENNEDY, JOHN	Ch. Eng. Montreal Harbor Com- mrs., Montreal, Canada.	Sept.	1, 1875
KENNEDY, WILLIAM H.	Ch. Eng. San Francisco & Great Salt Lake R. R., 320 California st., San Francisco, Cal.	Sept.	6, 1871
KERNOT, WILLIAM C.	Univ. of Melbourne, Victoria, Aus- tralia.	March	6, 1889
KIELLAND, S. MUNCH	Div. Eng. Lehigh Valley Ry., cor. Main and Seneca sts., Buffalo, N. Y.	Feb.	6, 1889
KIERSTED, W.	619 Keith & Perry Bldg., Kansas City, Mo.	Oct.	5, 1887
KILLEBREW, SAMUEL	Brownsville, Tenn.	Sept.	2, 1885
KIMBALL, FRANCIS W.	Railway Contractor, Austin, Minn.	May	2, 1883
KIMBALL, GEORGE A.	Civil Eng., Exchange Bldg., { J. Boston, Mass. { M.	May	12, 1875
KIMBALL, GEORGE H.	87 Adelbert ave., Cleveland, Ohio.	July	1, 1891
KINDER, CLAUDE WILLIAM	Eng. in chf. and Supt. Imperial Chinese Rys., Tientsin, China.	Dec.	3, 1890
KING, CHARLES C.	Ch. Eng. C. W. Hunt Co., West New Brighton, Richmond Co., N. Y.	June	4, 1890
KING, FRANK P.	Asst. Ch. Eng. Denver & Rio Grande Ry., 17 Cheesman Block, Denver, Colo.	Sept.	2, 1891
KING, PAUL S.	Ch. Eng. Lehigh Valley Ry., Buf- falo, N. Y.	April	3, 1889
		July	3, 1889

Name.	Address.	Date of Membership.	
KINGMAN, LEWIS	City Eng., Topeka, Kans.	July	1, 1885
KINGSLEY, MARVIN W.	Supt. Water Works, 354 Superior st., Cleveland, O.	July	3, 1878
KINNEY, EDWARD C.	1630 Champa st., Denver, Colo.	May	3, 1882
KINSLEY, THOMAS P.	1425 Maryland ave., Baltimore, Md.	Feb.	5, 1873
KIRTLAND, ALFRED P.	Sec. & Treas. Marble Hill Quarry Co., Cheswick, Pa.	Sept.	7, 1887
KITTREDGE, GEORGE WATSON	Ch. Eng. C. C. C. & St. L. Ry., Cin- cinnati, Ohio.	Jan.	6, 1886
KNAP, JOSEPH M.	Manager, 365 West st., New York City.	April	5, 1882
KNAPP, LOUIS H.	Supt. and Eng. Buffalo Water Works, 280 Linwood ave., Buffalo, N. Y.	March	4, 1874
KNIGHT, ALBERT BRUCE	Mining Eng., U. S. Deputy Mineral Surveyor, Butte, Montana.	May	7, 1890
KUICHLING, EMIL	Ch. Eng. Water Works, 32 City Hall, Rochester, N. Y.	Sept.	3, 1884
LAFON, THOMAS	Columbia, Mo.	(J. March 3, 1875 M. Nov. 5, 1884	
LANDOR, EDWARD J.	Vice-Pres. and Eng. Wrought-Iron Bridge Co., 127 N. Poplar st., Canton, Ohio.	March	7, 1888
LANDRETH, OLIN H.	Prof. of Engineering Vanderbilt University, and Cons. Eng., Nashville, Tenn.	Sept.	3, 1884
LANDRETH, WILLIAM B.	20 Gillespie st., Schenectady, N. Y.	Oct.	3, 1888
LASSIG, MORITZ	97 Dearborn st., Room 5, Chicago, Ill.	April	2, 1884
LATCHA, JACOB A.	Coldwater, Mich.	May	7, 1873
LATHAM, HARRY H.	306 Dearborn st., Chicago, Ill.	Dec.	2, 1885
LATROBE, CHARLES H.	Gen. Supt. and Eng. Public Parks, 213 East German st., Baltimore, Md.	Nov.	16, 1870
LAWTON, WILLIAM H., Jr.	Street Commr. and City Eng., 20 Bellevue ave., Newport, R. I.	June	2, 1886
LEAVITT, ERASMUS D.	Cons. Eng. Calumet and Hecla Mining Co., 2 Central Sq., Cam- bridgeport, Mass.	July	2, 1873
LEAVITT, FRANK M.	Ch. Eng. E. W. Bliss Co., Ltd., Brooklyn, N. Y.	Dec.	2, 1885
LE BARON, JOHN FRANCIS	U. S. Mineral Surveyor and Cons. Eng., Jacksonville, Fla.	June	7, 1882
LE CONTE, LOUIS J.	Asst. U. S. Eng. in chg. Oakland Harbor Works, P. O. Box 492, Oakland, Cal.	April	4, 1877

Name.	Address.	Date of Membership.
LEDLIE, CHARLES H.	Cons. Eng., 417 Olive st., St. Louis, Mo.	Jan. 4, 1888
LEDERLE, GEORGE A.	401 Roe Bldg., St. Louis, Mo.	J. May 2, 1883 M. Oct. 6, 1886
LEHLBACH, GUSTAV	770 Broad st., Newark, N. J.	March 7, 1883
LEHNARTZ, FREDERICK W.	U. S. Asst. Eng., Grand Rapids, Mich.	Aug. 6, 1879
LEVERICH, G.	Mech. Eng. N. Y. and Brooklyn Bridge, office, 179 Washington st., Brooklyn, N. Y. (Residence, Maplewood, N. J.)	July 6, 1870
LEWIS, EUGENE C.	Pres. Sycamore Powder Co., Pres. and Gen. Mgr. Napier Iron Works, Nashville, Tenn.	March 5, 1873
LEWIS, EVERETT W.	City Eng.'s office, Duluth, Minn.	May 2, 1888
LEWIS, SIDNEY F.	State Eng., Cotton Exchange, New Orleans, La.	May 4, 1881
LIBBY, EDMUND D.	Asst. Eng. N. Y., N. H. & H. R. R., 141 Reservoir ave., Providence, R. I.	May 6, 1885
LIGHT, ALEXANDER L.	Ch. Eng. Govt. Rys., Province of Quebec, Quebec, Canada.	Sept. 7, 1881
LINCOLN, WILLIAM S.	Ch. Eng. Wabash R. R., St. Louis, Mo.	Dec. 5, 1883
LINDENTHAL, GUSTAV	Civil Eng., Lewis Block, Pittsburgh, Pa.	May 3, 1882
LINTON, HARVEY	City Eng., Altoona, Pa.	Oct. 5, 1892
LINVILLE, JACOB H.	Cons. Eng., 3610 Walnut st., Philadelphia, Pa.	May 3, 1875
LOCKE, AUGUSTUS W.	Civil Eng., North Adams, Mass.	June 7, 1882
LOCKE, CHARLES A.	Civil Eng., Nashville, Tenn.	Oct. 3, 1888
LONG, THOMAS J.	(Care Union Bridge Co.), 33 Telephone, Bldg., St. Louis, Mo.	J. Nov. 2, 1875 M. Jan. 7, 1880
LOOMIS, HORACE	Eng. in chg. Sewers, Dept. of Public Works, 31 Chambers st., New York City.	Nov. 5, 1879
LOREE, LEONOR F.	Div. Supt. Penna. Lines West, Cleveland, Ohio.	Oct. 6, 1886
LOTZ, WILLIAM H.	Mech. Eng., 68 Metropolitan Block, Chicago, Ill.	Sept. 1, 1875
LOVETT, THOMAS D.	Cons. Eng., 49 West Third st., Cincinnati, Ohio.	May 3, 1871
LOW, EMILE	Cons. Eng., Cedar Bluff, Va.	May 2, 1888
LOW, GORHAM P.	Gloucester, Mass.	April 21, 1869
LOWETH, CHARLES F.	Cons. Eng., 560 Drake Block, St. Paul, Minn.	J. Jan. 3, 1883 M. Feb. 6, 1884

MEMBERS.

Name.	Address.	Date of Membership.		
LOWRIE, HARVEY C.	P. O. Box 2196, Denver, Colo.	March	2,	1892
LUCAS, D. JONES	Prin. Asst. Eng. Phila. Belt Line R. R. (with Wilson Bros. & Co.), 1036 Drexel Bldg., Philadelphia, Pa.	{	J.	Sept. 6, 1876
			M.	July 4, 1888
LUCIUS, ALBERT	Civil Eng., 71 Broadway, New York City.		March	3, 1886
LUDLOW, WILLIAM	Maj. of Engs., Bvt. Lt.-Col. U. S. A., Detroit, Mich.		July	5, 1882
LUNDIE, JOHN	Cons. Eng., Eng. & Gen. Agent King Bridge Co., 1105-1107 The Rookery, Chicago, Ill.		July	4, 1888
LUSE, JAMES LORING	Capt. Corps of Engrs., U. S. A., Asst. to Engineer Commr., Washington, D. C.		March	4, 1891
LUTZ, ULYSSES S.	Civil Eng., Holmesburg, Philadelphia, Pa.		July	6, 1887
LYNCH, MICHAEL LEHANE	Cons. Eng., Fort Worth, Texas.		May	4, 1892
MACDONALD, CHARLES	Member Union Bridge Co., 1 Broadway, New York City.		Sept.	15, 1869
MACFARLANE, JAMES	Ch. Eng. Anaconda Mining Co., Butte, Mont.		April	4, 1888
MACKENZIE, ALEXANDER	Maj. Corps of Engrs. U. S. A., Rock Island, Ill.		Feb.	2, 1887
MACKLIN, JOHN G.	Ch. Eng. Midland Div. Grand Trunk Ry., Peterborough, Ontario, Canada.		May	4, 1887
MACLAY, WILLIAM W.	Supt. Dept. of Docks, office, foot of Chambers st., North River (Residence, 24 West 120th st.), New York City.		Nov.	6, 1872
MACLEOD, JOHN	(Vice-President.) Cons. Eng., Kentucky National Bank Bldg., (Residence, 1603 Fourth ave.), Louisville, Ky.		July	10, 1872
MACNAUGHTON, JAMES	248 State st., Albany, N. Y.		May	5, 1880
MACRITCHIE, CHARLES	171 La Salle st., Chicago, Ill.	{	A.	Oct. 2, 1872
			M.	April 5, 1876
MAIS, HENRY C.	Cons. Eng., 61 Queen st., Melbourne, Victoria, Australia.		June	6, 1883
MALLORY, GEORGE B.	55 Broadway, New York City.		Sept.	3, 1884
MAN, ALBON PLATT, Jr.	Gen. Man. and Acting Ch. Eng. Silver Springs, Ocala & Gulf R. R., Ocala, Fla.		Sept.	5, 1883

MEMBERS.

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Name.	Address.	Date of Membership.	
MANLEY, HENRY	Asst. Eng. Engineering Dept., City Hall, Boston, Mass.	June	2, 1880
MANN, GEORGE E.	City Eng., City Hall, Buffalo, N. Y.	Sept.	3, 1884
MANSFIELD, M. W.	Supt. Penna. Co., Indianapolis & Vincennes Div., Indianapolis, Ind.	July	5, 1882
MANSON, MARSDEN	Civil Eng., office Board of Engs., N. W. cor. New City Hall, 2d Floor, San Francisco, Cal.	Sept.	6, 1882
MARINDIN, HENRY L.	Asst. U. S. Coast and Geodetic Survey, Washington, D. C.	May	7, 1884
MARPLE, WILLIAM M.	Eng. Scranton Gas and Water Co., 304 Mifflin ave., Scranton, Pa.	June	4, 1890
MARR, GEORGE A.	U. S. Asst. Eng. in chg. Portage Lake and Lake Superior Canals, Houghton, Mich.	Oct.	3, 1883
MARSHALL, HORACE M.	Asst. Eng. in chg. of surveys, U. S. Engineer office, Vicksburg, Miss.	Dec.	3, 1890
MARSLAND, EDWARD	Sing Sing, N. Y.	Feb.	6, 1878
MARSTRAND, O. J.	Asst. Eng. Brooklyn Elev. R. R., 31 Sands st., Brooklyn, N. Y.	May	7, 1890
MARTIN, CHARLES C.	Ch. Eng. and Supt. New York and Brooklyn Bridge, 179 Washington st., Brooklyn, N. Y.	July	10, 1872
MARTIN, ROBERT K.	Ch. Eng. Water Dept., City Hall, Baltimore, Md.	June	1, 1892
MARVIN, CHARLES EZRA	Pres. North Macon Land Co., 38 Exchange Bldg., Macon, Ga.	July	1, 1885
MASON, ARTHUR J.	1423 Jefferson st., Kansas City, Mo.	Sept.	5, 1888
MASON, S. D.	Asst. Purchasing Agent, Northern Pacific R. R., Tacoma, Wash.	Oct.	6, 1889
MASTEN, CORNELIUS S.	Vice-Pres. and Man. Maricopa & Phoenix R. R., Phoenix, Ariz.	Sept.	6, 1871
MAURICE, CHARLES S.	Union Bridge Co., Athens, Pa.	May	15, 1872
MAXIM, HIRAM S.	Managing Director Maxim Gun Co., Crayford, Kent, England.	Oct.	7, 1885
MAXSON, FRANK O.	Civil Eng. U. S. N., Navy Yard, Mare Island, Cal.	May	1, 1889
MAXWELL, DAVID F.	Civil Eng. St. Stephen, N. B., Canada.	March	2, 1887
MAXWELL, JAMES R.	Newark, Delaware.	April	17, 1872
MAX, WILLIAM A.	Supt. Hillside Coal and Iron Co., Scranton, Pa.	July	6, 1881
McCANN, THOMAS H.	Civil Eng., N. H. Co. Ry. Bldg., Hoboken, N. J.	April	2, 1890

Name.	Address.	Date of Membership.
McCLINTOCK, WILLIAM E.	Civil Eng., 23 Court st., Boston, Mass.	Dec. 5, 1888
McCLURE, ROBERT J.	(Care Chicago, Burlington & Quincy R. R.), Chicago, Ill.	Oct. 6, 1886
McCLURE, WILBUR F.	U. S. Dep. Mineral Surveyor, Garvanza, Los Angeles Co., Cal.	Nov. 3, 1886
McCOLLOM, THOMAS C.	Civil Eng. U. S. N., 12 Newbury st., Boston, Mass.	May 3, 1882
McCOMB, DAVID E.	Asst. Eng. District Government, Washington, D. C.	Feb. 7, 1877
McCOOL, DANIEL	(Care of C. L. W. Eidlitz), Mohawk Bldg., 160 Fifth ave., New York City.	Sept. 5, 1883
McDONALD, HARRY P.	(McDonald Bros., Architects), 5th and Market sts., Louisville, Ky.	March 5, 1884
McDONALD, HUNTER	Res. Eng. Western & Atlantic { J. R. R., Atlanta, Ga. { M.	April 4, 1883 March 7, 1888
McDONALD, JOHN ALEXANDER	Eng. for Bridges, Road and Bridge Dept., Sydney, N. S. W., Australia.	Feb. 5, 1890
McDOWELL, NATHAN M.	Civil Eng., 4223 Fifth ave., Pittsburgh, Pa.	April 4, 1877
McGRATH, WALLACE	Nat. Military Home, Leavenworth, Kans.	Sept. 5, 1883
McKEE, CHARLES HERNE	1008 Franklin st., Baltimore, Md.	June 4, 1879
McKEE, SAMUEL B.	Eng. for Witherbee, Sherman & Co., Port Henry Iron Ore Co., L. C. & M. R. R., Mineville, N. Y.	June 2, 1886
McKENZIE, THEODORE H.	Secy. and Treas. Southington Water Co., Member State Board Civil Engineers, Southington, Conn.	Sept. 7, 1881
McKEOWN, THOMAS	905 Seneca st., Buffalo, N. Y.	Dec. 3, 1879
McLAIN, LOUIS R.	Cons. & Contr. Eng., Pemberton, Fla.	Feb. 2, 1881
McMATH, ROBERT E.	Pres. R. E. McMath Surveying Co., 213 N. Eighth st., St. Louis, Mo.	March 3, 1880
McMILLAN, CHARLES	Prof. of Civil Engineering, College of New Jersey, Princeton, N. J.	Jan. 29, 1868
McMINN, THOMAS J.	277 Pearl st., New York City.	March 5, 1890
McNAIR, THOMAS S.	Res. Eng. Lehigh Valley R. R., P. O. Box 591, Hazleton, Pa.	July 2, 1873
McNULTY, GEORGE W.	(Director.) 45 Broadway, New York City.	May 5, 1880

Name.	Address.	Date of Membership.
McVEAN, JOHN J.	Ch. Eng. Chicago & West Michigan Ry. and Detroit, Lansing & Northern R. R., Grand Rapids, Mich.	Sept. 3, 1884
MEIER, EDWARD D.	Pres. and Ch. Eng. Heine Safety Boiler Co., St. Louis, Mo.	Feb. 4, 1880
MEIGS, MONTGOMERY	U. S. Civil Eng., U. S. Canal office, Keokuk, Ia.	March 5, 1879
MELVIN, DAVID N.	Linoleumville, Richmond Co., N. Y.	June 3, 1878
MENDELL, GEORGE H.	Col. Corps of Engs., Bvt.-Col. U. S. A., San Francisco, Cal.	Sept. 6, 1876
MENOCAL, ANICETO G.	Civil Eng. U. S. N., Ch. Eng. Nicaragua Canal Cons. Co., Washington, D. C.	Feb. 3, 1875
MERIWETHER, NILES	City Eng., 14 Talbot st., Memphis, Tenn.	Nov. 1, 1871
MERRILL, GEORGE N.	Civil Eng., 285 Main st., Springfield, Mass.	May 1, 1889
MERRILL, WILLIAM F.	Gen. Man. C. B. & Q. R. R., Chicago, Ill.	April 1, 1874
MERRIMAN, MANSFIELD	Prof. of Civil Engineering, Lehigh University, Bethlehem, Pa.	<div> <div>J.</div> <div>May 12, 1875</div> </div> <div> <div>M.</div> <div>Sept. 3, 1884</div> </div>
MERSEREAU, CHARLES V.	Second Asst. Eng. St. Louis Water Works Extension, 77 East May st., St. Louis, Mo.	Dec. 3, 1884
METCALF, WILLIAM	Managing Director Crescent Steel Co., 136 First ave., Pittsburgh, Pa.	July 2, 1874
MEYER, THOMAS C.	11 Waverly pl., New York City.	Dec. 7, 1852
MILLER, ALEXANDER M.	Major Corps of Eng., U. S. A., Custom House, St. Louis, Mo.	June 6, 1888
MILLER, HARRY IRVING	Supt. Louisville Div. Penna. Lines West of Pittsburgh, Louisville, Ky.	May 2, 1888
MILLER, J. IMBRIE	Bryn Mawr, Pa.	Oct. 5, 1887
MILLER, REUBEN	Director Crescent Steel Co., 136 First ave., Pittsburgh, Pa.	Sept. 1, 1875
MILLER, SILVANUS	Livingston, Guatemala, Central America, <i>via</i> New Orleans.	March 2, 1887
MILLS, ARTHUR L.	Ch. Eng. Toledo, St. Louis & Kansas City Ry., Toledo, Ohio.	May 2, 1888
MILLS, CHARLES M.	Phoenixville, Pa.	<div> <div>J.</div> <div>June 2, 1886</div> </div> <div> <div>M.</div> <div>Sept. 3, 1890</div> </div>
MILLS, JAMES E.	Cons. Geologist and Mining Eng., Quincy, Plumas Co., Cal.	Feb. 3, 1886
MINTURN, ROWLAND R.	Supt. Wis. Valley Div. C. M. & St. P. Ry., Babcock, Wis.	Nov. 2, 1887

Name.	Address.	Date of Membership.
MITCHELL, HENRY	18 Hawthorn st., Roxbury, Mass.	Jan. 7, 1880
MOHUN, EDWARD	Ch. Eng. Sewerage Work, City Hall, Victoria, B. C.	April 6, 1892
MONTFORT, RICHARD	Ch. Eng. Louisville & Nashville R. R., Louisville, Ky.	June 6, 1888
MOORE, CHARLES E.	Santa Clara, Cal.	Jan. 7, 1880
MOORE, JAMES	Cons. Eng. Central R. R., of New Jersey, Elizabeth, N. J.	Dec. 4, 1867
MOORE, ROBERT	(Director.) Ch. Eng. St. Louis Mer- chants' Bridge Terminal Ry., La- clede Bldg., St. Louis, Mo.	April 5, 1876
MORISON, GEORGE S.	The Temple, Chicago, Ill.	Jan. 6, 1875
MORRILL, GEORGE S.	Ch. Eng. Old Colony R. R., Boston, Mass.	March 2, 1887
MORRIS, CHARLES J. A.	Cons. Eng. and Gen. Contractor, P. O. Box 2544, St. Paul, Minn.	Oct. 3, 1883
MORRIS, GOUVERNEUR	Johnson City, Tenn.	Oct. 3, 1888
MORRIS, HENRY G.	Eng. and Machinist, 926 Drexel Bldg., Philadelphia, Pa.	Dec. 4, 1867
MORRIS, MARSHALL	16 Norton Bldg., Louisville, Ky.	March 5, 1873
MORRIS, ROBERT C.	Ch. Eng. Nashville, Chattanooga & St. Louis Ry., 1000 Broad st., Nashville, Tenn.	Jan. 7, 1874
MORRIS, S. FISHER	Mine Manager Pulaski Iron Co., Kyle, McDowell Co., W. Va.	April 6, 1887
MORRIS, THOMAS O.	Asst. Ch. Eng. Cleveland, Chicago, Cincinnati and St. Louis Ry., In- dianapolis, Ind.	Oct. 6, 1886
MORSE, BENJAMIN F.	Inspector of Bldgs., 113 City Hall, Cleveland, Ohio.	July 12, 1877
MORSE, CHARLES J.	Civil and Cons. Eng., 1103 Manhat- tan Bldg., Chicago, Ill.	Feb. 6, 1884
MORSE, HENRY G.	Pres. Edge Moor Bridge Works, Wil- mington, Del.	April 7, 1880
MORSS, FOSTER B.	Front Royal, Va.	Nov. 6, 1872
MOSMAN, ALONZO T.	Asst. Coast and Geodetic Survey Commr., International Boundary Com. U. S. & Mexico, Nogales, Ariz.	July 1, 1885
MOULTON, MACE	Man. and Ch. Eng. The R. F. Hawkins Iron Works, Springfield, Mass.	June 1, 1884
MOYLAN, JAMES	Civ. Eng., 330 Palisade ave., Jersey City, N. J., and 71 Broadway, New York City.	Nov. 2, 1887
MÜNSTER, A. W.	Asst. Eng. in chg. Bridge Dept. City Engr's. office, St. Paul, Minn.	May 1, 1889

Name.	Address.	Date of Membership.
NORTH, EDWARD P.	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	Dec. 4, 1867
NORTHROP, HERBERT FRANKLIN	Div. Eng. C. & W. M. Ry., Traverse City, Mich.	Jan. 6, 1892
NORTHWAY, WILLIAM R.	Civil Eng., 527 The Rookery, Chicago, Ill.	July 3, 1889
NOURSE, EDWIN G.	Eng. Railroads, World's Columbian Exposition, Jackson Park, Chicago, Ill.	Sept. 3, 1884
NOYES, ALBERT F.	City Engineer, West Newton, Mass.	Dec. 3, 1884
NOYES, ELLIS B.	Man. Milroy Cement Works, Lewistown, Pa.	J. July 7, 1880 M. Oct. 2, 1889
OCKERSON, JOHN A.	U. S. Asst. Eng., Miss. River Comm., 2732 Pine st., St. Louis, Mo.	July 7, 1880
ODELL, FREDERICK S.	Commr. of Public Works, Mt. Vernon, N. Y.	March 5, 1884
O'HANLY, JOHN L. P.	Ch. Eng. Ontario Pacific Ry., Ottawa, Ontario, Canada.	Sept. 5, 1883
OLNEY, GEORGE R.	45 W. 35th st., New York City.	March 7, 1888
OLNEY, LAFAYETTE	Middletown, N. Y.	Oct. 7, 1868
OPDYKE, STACY B., Jr.	(Benner & Opdyke, Engrs. and Contractors), 226 S. 4th st., Philadelphia, Pa.	Feb. 2, 1876
ORANGE, JAMES	Civil Eng. (Danby, Leigh & Orange), Hong Kong, China.	Dec. 3, 1890
ORBISON, THOMAS W.	(Edwards and Orbison, Hydraulic and Civil Engrs.), Appleton, Wis.	Sept. 3, 1884
O'ROURKE, JOHN F.	Eng. Surveys, etc., Rapid Transit Comm., 22 William st., New York City.	April 2, 1884
OSBORN, FRANK C.	Civil and Cons. Eng., Room 452, The Arcade, Cleveland, Ohio.	Oct. 3, 1888
OSGOOD, JOSEPH O.	Cons. Eng., 120 Broadway, New York City.	J. May 3, 1876 M. March 5, 1879
OSTROM, JOHN N.	Bridge Eng., 45 Broadway, New York City.	Nov. 5, 1890
OWEN, JAMES	800 Broad st., Newark, N. J.	Sept. 15, 1869
OWENS, HENRY K.	Ch. Eng. Northwest Eng. and Cons. Co., Seattle, Wash.	March 6, 1889
PACKARD, RALPH G.	Pres. and Gen. Man. Atlantic Dredging Co., 34 Pinest., New York City. (Residence, Morristown, N. J.)	Feb. 17, 1869
PAINÉ, ARTHUR B.	35 Broadway, New York City.	Sept. 6, 1882

Name.	Address.	Date of Membership.
PAINE, CHARLES	(<i>Past-President.</i>) Cons. Eng., 71 Broadway, New York City.	Dec. 4, 1867
PALMER, CORNELIUS	Div. Eng. Peninsula Div. Chicago & Northwestern Ry., Escanaba, Mich.	Nov. 2, 1887
PARENT, ETIENNE HENRI	Supt. Eng. of Canals, Montreal Div. (P. O. Box 2031), Montreal, Canada.	Sept. 7, 1881
PARET, MILNOR P.	Civil Eng., 210 E. Lexington st., Baltimore, Md.	Sept. 2, 1885
PARKER, ANDREW McCLEAN	Asst. Eng. Dept. Docks, foot East 16th st., New York City.	March 6, 1889
PARKER, C. O.	Civil Eng., 33 Keystone Block, Chattanooga, Tenn.	Oct. 2, 1889
PARKER, MAURICE S.	Eng. Great Falls W. P. & T. Co., Great Falls, Mont.	Feb. 5, 1890
PARKHURST, HENRY WILLIAMS	Eng. Bridges I. C. R. R., 58 Michigan ave., Chicago, Ill.	Sept. 5, 1877
PARSONS, HENRY C.	State Engineer's Office, 49 First st., Albany, N. Y.	Oct. 6, 1886
PARSONS, WM. BARCLAY	Cons. Eng., 22 William st., New York City.	June 7, 1882
PARTRIDGE, JOHN A.	511 6th st., N. W., Washington, D. C.	Nov. 2, 1887
PATTEN, HENRY B.	Div. Eng., Wyoming Div. Union Pacific R. R., 208 West 22d st., Cheyenne, Wyo.	Sept. 6, 1882
PATTERSON, JOHN CURTIS	1919 Spruce st., Philadelphia, Pa.	Jan. 4, 1888
PEARL, JAMES W.	Civil Eng., Benton Harbor, Mich.	Oct. 2, 1889
PEARSONS, GALEN W.	Kansas City, Mo.	Jan. 2, 1889
PEARY, ROBERT E.	Civil Eng. U. S. N., U. S. Navy Yard, League Island, Pa.	Jan. 6, 1875
PEGRAM, GEORGE H.	Cons. Eng., 3625 Finney ave., St. Louis, Mo.	March 3, 1886
PERKINS, CHARLES P.	Real Estate Department, Penn. R. R., 233 South 4th st., Philadelphia, Pa.	July 7, 1880
PETERSON, P. ALEX.	(<i>Director.</i>) Ch. Eng. Canadian Pacific R. R., Montreal, Canada.	Jan. 3, 1883
PETRY, ALFRED	911 Scott st., Covington, Ky.	Feb. 3, 1875
PETTIT, ROBERT E.	Altoona, Pa.	April 5, 1882
PEW, ARTHUR	Ch. Eng. Middle Ga. & Atlantic Ry., Talbotton, Ga.	Nov. 1, 1876
PICKETT, WILLIAM D.	Arland, Big Horn Co., Wyoming.	Dec. 2, 1885
PIERSON, GEORGE S.	Civil and San. Eng., Kalamazoo, Mich.	July 6, 1853
PIHL, OLAF R.	611 Marquam Bldg., Portland, Ore.	June 5, 1889
		Oct. 2, 1889

Name.	Address.	Date of Membership.
PIKE, WILLIAM A.	Cons. Eng., 630 Guaranty Loan Bldg., Minneapolis, Minn.	Dec. 3, 1890
PLAYLE, EDWARD F.	Manhattan Club, New York City.	Nov. 2, 1887
PLYMPTON, GEORGE W.	Prof. Physical Science and Engineering, 127 Herkimer st., Brooklyn, N. Y.	Jan. 29, 1868
POE, ORLANDO METCALFE	Col. Corps of Engs., Bvt. Brig.-Gen. U. S. A., 34 West Congress st., Detroit, Mich.	Jan. 8, 1873
POETSCH, CHARLES J.	Asst. City Eng., Court House, Milwaukee, Wis.	{ J. May 4, 1881 { M. May 2, 1883
POPE, WILLARD S.	Pres. and Eng. Detroit Bridge and Iron Works, Detroit, Mich.	Aug. 7, 1872
PORTER, ALBERT H.	50 Euclid ave., Cleveland, Ohio.	March 6, 1889
POST, ANDREW J.	(Post & McCord, Engs. and Contractors), 102 Broadway, New York City.	Nov. 1, 1871
POST, JAMES C.	Maj. Corps of Engs. U. S. A., 123 Victoria st., S. W., London, England.	Feb. 6, 1878
POST, LEVI W.	(Care Post & McCord), 102 Broadway, New York City.	March 5, 1873
POTTER, HENRY W.	Gen. Man. Cerro Colorado Mining Co., Cerro Colorado, Batopilas, Chihuahua, Mexico.	Dec. 5, 1888
POTTS, JOSEPH D.	Pres. Enterprise Transit Co., Pres. Chester Pipe & Tube Co., 234 South 4th st., Philadelphia, Pa.	Aug. 5, 1868
POWELL, CHARLES F.	Capt. Corps of Engs., U. S. A., Sioux City, Iowa.	Oct. 3, 1888
POWERS, JOSEPH A.	Lansingburgh, N. Y.	{ J. April 2, 1884 { M. Sept. 3, 1890
POYNOR, D. A.	City Eng., Dallas, Tex.	June 1, 1892
PRATT, WILLIAM A.	Div. Eng. Maintenance Way, Baltimore & Ohio R. R., 2400 Chestnut st., Philadelphia, Pa.	July 5, 1882
PRENDERGAST, FRANCIS E.	Chula Vista, San Diego Co., Cal.	March 7, 1888
PRENTISS, F. H.	Gen. Man. and Eng. New York Steam Co., 2 Cortlandt st., New York City.	July 2, 1890
PREVOST, SUTHERLAND M.	Gen. Supt. Transportation Penn. R. R., 233 South 4th st., Philadelphia, Pa.	Jan. 6, 1875
PRICE, PHILIP M.	Capt. Corps Engs., U. S. A., Montgomery, Ala.	May 2, 1888
PRINCE, EDWARD	Cons. Eng., Quincy, Ill.	{ J. Feb. 6, 1878 { M. Nov. 1, 1882
PRINDLE, FRANKLIN COGSWELL	Civ. Eng. U. S. N., U. S. Navy Yard, Boston, Mass.	March 4, 1874

Name.	Address.	Date of Membership.
PRIOR, CHARLES H.	Civil Eng., 516 New York Life Bldg., Minneapolis, Minn.	March 1, 1882
PROBASCO, SAMUEL R.	179 Washington st., Brooklyn, N. Y.	Nov. 18, 1868
PROUT, HENRY G.	Mang. Editor <i>Railroad Gazette</i> , { A. 73 Broadway, New York City. } M.	Nov. 6, 1872 Sept. 3, 1879
PURDON, CHARLES D.	Bridge Eng. Atchison, Topeka and Santa Fé R. R., Topeka, Kans.	March 3, 1886
QUIMBY, HENRY H.	Asst. Eng. The Phoenix Bridge Co., Phoenixville, Pa.	Sept. 3, 1890
QUINTUS, JOHN CHARLES	U. S. Inspector, U. S. Engineer's Office, Erie, Pa.	Jan. 2, 1889
RADENHURST, WILLIAM N.	Asst. Eng. Rochester Water { J. Works, 31 City Hall, Roches- } M. ter, N. Y.	July 7, 1875 July 7, 1880
RAFTER, GEORGE W.	Rochester, N. Y.	April 2, 1884
RAMSEY, JOSEPH, JR.	Gen. Man. C., C., C. & St. L. Ry., Cincinnati, O.	May 1, 1889
RANDOLPH, BEVERLY S.	Mining Supt. Consolidation Coal Co., Frostburg, Md.	May 2, 1888
RANDOLPH, L. S.	Eng. Tests B. & O. R. R., Mt. Clare, Baltimore, Md.	Jan. 2, 1889
RAY, NATHANIEL C.	Butte, Mont.	July 5, 1882
RAYMOND, CHARLES WARD	Cons. Mining Eng., Platoro, { J. Colo. } M.	Nov. 7, 1877 April 7, 1886
RAYMOND, CHARLES WALKER	Major Corps Engs. U. S. A., 1428 Arch st., Philadelphia, Pa.	June 1, 1892
REA, SAMUEL	Asst. to Pres. P. R. R., 233 S. 4th st., Philadelphia, Pa.	June 4, 1884
READ, ROBERT L.	(Director.) Civil Eng., 64 West 3d st., Cincinnati, O.	Sept. 2, 1874
REECE, BENJAMIN	707 Phenix Bldg., Chicago, Ill.	March 2, 1881
REED, HENRY WADSWORTH	Mast. of Roadway, Savannah, Florida & Western Ry., Waycross, Ga.	Jan. 6, 1886
REEVES, DAVID	Pres. The Phoenix Iron Co., { J. Pres. Phoenix Bridge Co., } M. Philadelphia, Pa.	April 1, 1874 May 3, 1882
RHODES, BENJAMIN	Pres. Brush Electric Light and Power Co., Niagara Falls, N. Y.	April 5, 1882
RICE, EDWARD C.	3649 Pine st., St. Louis, Mo.	April 7, 1875
RICE, GEORGE S.	Civil and Hydr. Eng., 95 Milk st., Boston, Mass.	Feb. 1, 1882
RICE, LEWIS FREDERICK	Asst. Eng. Am. Bell Telephone Co., 125 Milk st., Boston, Mass.	Jan. 2, 1889

Name.	Address.	Date of Membership.
RICE, WALTER P.	Civil Eng., Cleveland, Ohio.	March 6, 1889
RICH, WATSON W.	Ch. Eng., Minneapolis, St. Paul & Sault Ste. Marie Ry., Minneapolis, Minn.	Sept. 5, 1883
RICHARDS, H. TUDOR	Asst. Gen. Man. Sonoro R. R., Guaymas, Sonoro, Mexico.	Oct. 6, 1886
RICHARDSON, B. FRANK	Asst. Eng. Baltimore & Ohio R. R., 1246 S. 22d st., Philadelphia, Pa.	July 1, 1885
RICHARDSON, HENRY B.	Ch. State Eng., New Orleans, La.	May 7, 1879
RICHARDSON, THOMAS F.	Asst. Eng. Sanitary Dist., 526 Rialto Bldg., Chicago, Ill.	Nov. 4, 1885
RICKETTS, PALMER C.	Director of, and Prof. of, Rational and Technical Mechanics, Rensselaer Pol. Inst., Troy, N. Y.	<div> <div></div> <div> <div>A.</div> <div>Feb.</div> <div>4, 1886</div> </div> <div> <div>M.</div> <div>Oct.</div> <div>5, 1887</div> </div> </div>
RICKON, FRED J. H.	City Eng., Little Rock, Ark.	Jan. 4, 1888
RIFFLE, ALBERT S.	Oregon Bridge Co., Goodnough Bldg., Portland, Ore.	May 7, 1890
RIFFLE, FRANKLIN	Oregon Bridge Co., Goodnough Bldg., Portland, Ore.	Nov. 7, 1888
RINECKER, FRANCIS	Civil Eng., Wuerzburg, Germany.	Aug. 7, 1872
RISER, K. S.	413 Third st., Clinton, Iowa.	Feb. 3, 1892
RITCHIE, JAMES	Civil and Cons. Eng., Hotel Lennox, Cleveland, Ohio.	Nov. 5, 1890
RIVES, ALFRED L.	Gen. Supt. Panama R. R. (care Panama R. R.), 29 Broadway, New York City.	Sept. 4, 1872
ROBERTS, EVELYN P.	Asst. Eng. Aqueduct Commission (Box 527), Sing Sing, N. Y.	May 7, 1884
ROBERTS, PERCIVAL, JR.	261 South 4th st., Philadelphia, Pa.	<div> <div>A.</div> <div>May</div> <div>7, 1879</div> </div> <div> <div>M.</div> <div>June</div> <div>4, 1884</div> </div>
ROBINSON, ALBERT A.	Second Vice-Pres. and Gen. Man. A. T. & S. F. R. R., Topeka, Kans.	May 5, 1880
ROBINSON, A. F.	Asst. Eng. C. R. I. & P. Ry., 910 Monroe st., Topeka, Kans.	Nov. 2, 1887
ROBINSON, A. W.	Eng. Bucyrus Steam Shovel and Dredge Co., Bucyrus, Ohio.	Feb. 3, 1892
ROBINSON, GEORGE H.	Gen. Man. The Montana Co. (Ltd.), Helena and Marysville, Mont. (Bayliss & Robinson), 54 Old Broad st., London, England.	March 7, 1888
ROBINSON, JOHN J.	Union Pl., Brooklyn Hills, Woodhaven, N. Y.	April 3, 1889
ROBINSON, STILLMAN W.	Prof. of Mech. Eng. Ohio State University, 1353 Highland st., Columbus, Ohio.	Jan. 2, 1884
ROCKWELL, SAMUEL	Eng. M. S. Div., L. S. & M. S. Ry., Toledo, Ohio.	Jan. 7, 1880

Name.	Address.	Date of Membership.	
RODD, THOMAS	Ch. Eng. Penn. Co., Pittsburgh, Pa.	Jan.	5, 1878
ROGERS, FAIRMAN	Civil Eng., 134 South 4th st., Philadelphia, Pa.	May	7, 1873
ROGERS, MERRITT H.	Ch. Eng. D. & R. G. R. R., 1107 E. 14th ave., Denver, Colo.	Jan.	2, 1890
ROOD, HENRY M.	373 Monroe st., Chicago, Ill.	Dec.	3, 1890
ROSE, CHARLES C.	Div. Eng. Delaware, Lackawanna & Western R. R., Box D, Scranton, Pa.	April	4, 1888
ROSECRANS, WILLIAM S.	Bvt. Maj.-Gen., U. S. A., Washington, D. C.	July	5, 1882
ROSEWATER, ANDREW	City Eng., Bee Bldg., Omaha, Neb.	Oct.	3, 1883
ROSS, JAMES	Pres. Dominion Bridge Co., 20 St. Alexis st., Montreal, Canada.	Sept.	6, 1882
ROTCH, WILLIAM	Pres. Consolidated Electric Mfg. Co., 8 Exchange pl., Boston, Mass.	March	5, 1873
ROTHWELL, RICHARD P.	Civil and Mining Eng., Editor <i>Engineering and Mining Journal</i> , 27 Park pl., New York City.	Jan.	29, 1868
ROWE, ROBERT DELOS	Civil and Cons. Eng., 332 Webster ave., Chicago, Ill.	Jan.	2, 1890
ROWE, SAMUEL M.	Cons. Eng., 332 Webster ave., Chicago, Ill.	Sept.	2, 1885
ROWLAND, CHARLES L.	Propr. Morton Iron Works (Residence, 61 Morton st.), Brooklyn, N. Y.	Sept.	1, 1886
ROWLAND, THOMAS F.	Pres. The Continental Iron Works, Brooklyn, N. Y. (Residence, 329 Madison ave., New York City.)	Dec.	4, 1867
ROWLAND, THOMAS F., Jr.	Sec. and Treas. The Continental Iron Works (P. O. Station G), Brooklyn, N. Y.	Sept.	1, 1886
RUDLOFF, HENRY F.	Ch. First Sec. Gram. Ferro Carril de Venezuela, Caracas, Venezuela.	Jan.	6, 1886
RUGGLES, WILLIAM B.	Ch. Eng. C. P. & O. R. R., United Bank Bldg., Cincinnati, Ohio.	April	7, 1886
RUMBLE, WILLIAM	20 West 38th st., Bayonne, N. J.	Sept.	1, 1886
RUNDLETT, LEONARD W.	City Eng., St. Paul, Minn.	Sept.	5, 1883
RUSLING, GEORGE M.	Civil Eng. and Contractor, Hackettstown, N. J.	Nov.	1, 1882
RUSSELL, NATHANIEL E.	Hoosic Falls, N. Y.	Oct.	3, 1888
RUSSELL, S. BENT	Asst. Eng. in chg. Water Works Extension, 77 East May st., St. Louis, Mo.	J. June	4, 1884
		M. June	1, 1887
RUTHERFURD, FRANCIS M.	Eng. Maint. Way Richmond & Danville R. R., Richmond, Va.	Oct.	6, 1886

Name.	Address.	Date of Membership.	
SAABYE, OSCAR	Cons. Eng., Roanoke, Va.	Oct.	1, 1890
SAFFORD, EDWARD S.	Sharon, Mass.	Dec.	6, 1882
SAMPLE, JOHN H.	Ch. Eng. Pittsburgh, Akron & Western R. R., Akron, Ohio.	Oct.	6, 1886
SANDERSON, J. GARDNER	Civil Eng., 1530 Sanderson ave., Scranton, Pa.	July	6, 1881
SAUNDERS, WILLIAM L.	Secy. and Eng. Ingersoll-Sergeant Drill Co., 10 Park pl., New York City.	Nov.	3, 1886
SAVAGE, ALBERT C.	Asst. Eng. Trenton Iron Co., 61 Broadway, New York City.	May	4, 1881
SCAIFE, WM. LUCIEN	Chairman Scaife Foundry and Mach. Co. (Ltd.), Pittsburgh, Pa.	Dec.	3, 1890
SCHAEFFER, JOHN S.	Cons. Civil Eng., 191 Littleton ave., Newark, N. J.	June	2, 1886
SCHAUB, JULIUS W.	1614 Second-Carondelet ave., { J. St. Louis, Mo. { M.	Nov.	5, 1884
SCHENCK, ARCHIBALD A.	Ch. Asst. Eng. N. Y. C. & H. R. R. R., West Shore R. R., Grand Central Station, New York City.	Oct.	1, 1890
SCHERZER, ALBERT J.	(Care W. H. Harned) 330 Drexel Bldg., Philadelphia, Pa.	Jan.	6, 1886
SCHERZER, WILLIAM	Asst. Eng. Keystone Bridge Co., 509 Home Insurance Bldg., Chicago, Ill.	Sept.	5, 1888
SCHMIDT, MAX E.	Ch. Eng. and Gen. Man. Multiple Speed and Traction Co., 54 Lakeside Bldg., Chicago, Ill.	May	7, 1879
SCHNEIDER, CHARLES C.	Ch. Eng. Pencoyd Bridge and Construction Co., Pencoyd, Pa.	Feb.	6, 1884
SCHUYLER, JAMES D.	(Director.) Cons. Eng., Citizens' Water Co., Denver, Colo.	Dec.	6, 1882
SCOTT, ADDISON M.	Res. Eng. U. S. Imp. Gt Kanawha River, Charleston, West Va.	June	2, 1886
SCOTT, ARTHUR H.	67 Moffat Block, Detroit, Mich.	May	2, 1883
SCOTT, CHARLES A.	Eng. and Contractor, Contr. Lower Laurentian Ry., Quebec, Canada.	Nov.	5, 1884
SCOVILL, E. TRACY	Civil Eng., (care Union Club), Cleveland, Ohio.	Sept.	6, 1876
SEAMAN, HENRY B.	10 West 29th st., New York { J. City. { M.	June	2, 1886
SEARLES, WILLIAM H.	Cons. Eng., 5 Euclid ave., Cleveland, Ohio.	Dec.	7, 1887
SEARS, ALFRED FRANCIS	Portland, Ore.	July	2, 1873
SEDGWICK, THOMAS S.	Ch. Eng. Board of State Harbor Commrs. for Bay of San Diego, San Diego, Cal.	June	2, 1869
		July	20, 1870

Name.	Address.	Date of Membership.	
SEE, HORACE	Naval Architect, 1 Broadway, New York City.	June	1, 1892
SELLERS, COLEMAN	Cons. Eng., Prof. Eng. Practice, Stevens Institute, Hoboken, N. J. (Address: 3301 Baring st., Philadelphia, Pa.)	May	3, 1876
SELLERS, WILLIAM	1819 Vine st., Philadelphia, Pa.	May	3, 1876
SENGOKU, MITSUGU	Railway Dept., Tokio, Japan.	June	4, 1890
SEWALL, JOSEPH S.	44 Gilfillan Block, St. Paul, Minn.	July	7, 1875
SEYMOUR, CHARLES	Madisonville, Hopkins Co., Ky.	Sept.	6, 1871
SEYMOUR, HORATIO	Mang. Director Michigan Land and Iron Co. (Limited), Marquette, Mich.	{ A. Jan. 3, 1873 M. April 7, 1880	
SHAILER, ROBERT A.	(Shailer & Schniglan, Engs. and Contractors), 611 Phenix Bldg., Chicago, Ill.		
SHANKLAND, E. C.	Eng. of Cons. World's Col. Exposition; Eng. to D. H. Burnham, Architect, Jackson Park, Chicago, Ill.	March	3, 1880
SHANKS, THOMAS P.	Civil Eng., 237 Jacob st., Louisville, Ky.	Feb.	5, 1890
SHANLY, JAMES MOORE	(Shanly & McCarthy), Standard Bldg., Montreal, Canada.	May	2, 1888
SHAW, GRANVILLE W.	U. S. Asst. Eng. Ohio Falls River Impvt., Box 124, Louisville, Ky.	July	6, 1887
SHEARER, SAMUEL H.	Man. Western Paving and Supply Co., 33 Ingalls Block, Indianapolis, Ind.	Oct.	5, 1887
SHEDD, J. HERBERT	City Eng., City Hall, Providence, R. I.	Jan.	5, 1887
SHEPARD, DAVID C.	St. Paul, Minn.	Sept.	15, 1869
SHERMAN, RICHARD WILLETTE	Pres. Troy Public Works Co., 16 Plant st., Utica, N. Y.	May	2, 1883
SHIRREFFS, REUBEN	1103 Main st., Richmond, Va.	Oct.	6, 1887
SHNELEF, TH.	Imp. Russian Eng., Reval, Russia.	June	4, 1890
SICARD, MIRTILIANO	Ibague, Tolimo, U. S. Colombia.	Sept.	7, 1892
SICKELS, FREDERICK E.	Ch. Eng. National Water Works Co., Kansas City, Mo.	Jan.	4, 1882
SIMPSON, ALFRED H.	Ch. Eng. National Water Works Co., Kansas City, Mo.	Jan.	7, 1891
SIMPSON, GEORGE F.	Civil Eng., 35 Broadway, New York City.	Jan.	7, 1891
SIMPSON, GEORGE H.	Ch. Eng. Harriman Coal & Iron R.R., Lock Box 194, Harriman, Tenn.	Sept.	7, 1887
SKILTON, GEORGE S.	Terre Haute, Ind.	March	2, 1887
SKINNER, FRANK W.	372 Decatur st., Brooklyn, N. Y.	Oct.	6, 1880
	Editorial Staff <i>The Engineering Record</i> , 277 Pearl st., New York City.	Sept.	7, 1881
		Sept.	1, 1886

Name.	Address.	Date of Membership.
SLATAUER, FELICIAN	Cons. Eng. Pennsylvania Co., Pittsburgh, Pa.	Sept. 15, 1869
SLOAN, ROBERT I.	Ch. Eng. Chicago & South Side Elev. Ry., 627 The Rookery, Chicago, Ill.	Oct. 1, 1884
SMEDLEY, SAMUEL L.	Ch. Eng. Dept. Public Works, Room 418, City Hall, Philadelphia, Pa.	Sept. 2, 1874
SMITH, ALBERT M.	Supt. 18th Street Station, Consolidated Gas Co., 18th st., and Tenth ave., New York City.	May 5, 1886
SMITH, B. BURGH	Asst. U. S. Light House Eng., 5 Southern Wharf, Charleston, S. C.	Nov. 7, 1888
SMITH, D. LOWBER	Cons. Eng., Bridgeport, Ala. (Address: 62 West 83d st., New York City.)	May 4, 1887
SMITH, FREDERICK H.	Civil and Cons. Engineer and Bridge Builder, 227 East German st., Baltimore, Md.	Feb. 21, 1872
SMITH, GEORGE C.	(Care E. J. Blake, Ch. Eng. C. B. & Q. Ry.), Chicago, Ill.	Dec. 3, 1890
SMITH, HAMILTON, JR.	30 St. Swithin's Lane, London, E. C., England.	Feb. 5, 1879
SMITH, ISAAC A.	Ch. Eng. St. Louis Transfer Ry., East St. Louis Con. Ry., Wiggins Ferry Co., Room 31, Rep. Bldg., St. Louis, Mo.	Oct. 3, 1888
SMITH, ISAAC W.	Supt. City Water Works, Portland, Oregon.	Oct. 1, 1873
SMITH, JARED A.	Lieut.-Col. Corps Engs., U. S. A., 185 Euclid ave., Cleveland, Ohio.	May 2, 1883
SMITH, JOSEPH SHUTER	Manheim st., Germantown, Philadelphia, Pa.	April 1, 1874
SMITH, LUCIUS A.	The Continental Iron Works, Brooklyn, N. Y.	May 7, 1873
SMITH, MILLER A.	Ch. Eng. Sigua Iron Co., Santiago, Cuba.	Oct. 6, 1886
SMITH, OBERLIN	Pres. Ferracute Machine Co., Bridgeton, N. J.	Sept. 3, 1884
SMITH, T. GUILFORD	Vice-Pres. N. Y. Car Wheel Works, German Ins. Bldg., Buffalo, N. Y.	Sept. 6, 1871
SMITH, S. HARRISON	318 Pine st., San Francisco, Cal.	July 3, 1889
SMITH, WILLIAM SOOY	Civil Eng., 1005 Owings Bldg., Chicago, Ill.	Jan. 17, 1872
SNOW, J. PARKER	Bridge Eng. Boston & Maine R. R., Boston, Mass.	June 3, 1885
SOMERVILLE, ROBERT	Asst. Eng. Board Mississippi Levee Com., Greenville, Miss.	June 1, 1887

Name.	Address.	Date of Membership.
SONNE, OTTO	P. O. Box 3051, Boston, Mass.	Sept. 7, 1887
SOOYSMITH, CHARLES	(Pres. SooySmith & Co., Cons. and Contracting Engs.), 2 Nassau st., New York City.	May 5, 1886
SORZANO, JULIO F.	Cons. Civil Eng., 33 Broadway, New York City.	Sept. 3, 1884
SOSA, PEDRO J.	Panama, U. S. Colombia.	Dec. 3, 1884
SOULE, HOWARD	Cons. Eng. Water Board, Syracuse, N. Y.	March 17, 1869
SPALDING, FRED. PUTNAM	Asst. Prof. Civil Eng., Cornell University, 36 Eddy st., Ithaca, N. Y.	Dec. 2, 1891
SPENCER, SAMUEL	23 Wall st., New York City.	Sept. 2, 1885
SPROULE, WILLIAM J.	Prin. Asst. Eng. Harbor Trust, Montreal, Canada.	Sept. 1, 1886
STAATS, JOHN H.	(R. P. & J. H. Staats, Civil Engs. and Contractors), 29 Broadway, New York City.	March 5, 1884
STAATS, ROBERT P.	(R. P. & J. H. Staats, Civil Engs. and Contractors), 29 Broad- way, New York City.	J. Nov. 3, 1875 M. July 1, 1885
STALEY, CADY	Pres. Case School Applied Science, Cleveland, Ohio.	March 17, 1869
STANIFORD, CHARLES W.	Asst. Surveyor, Dept. of Docks, Pier A, North River, New York City.	May 7, 1890
STANTON, ROBERT B.	Civil and Mining Eng., Denver, Colo., and 2 Wall st., New York City.	Sept. 1, 1880
STARLING, WILLIAM	Ch. Eng. Mississippi Levee District, Greenville, Miss.	Sept. 7, 1887
STARR, ARTHUR B.	Supt. E. Div., P. R. R., Allegheny, Pa.	June 5, 1889
STAUFFER, DAVID McNEELY	Editor <i>Engineering News</i> , Tribune Bldg., New York City.	Sept. 2, 1874
STEARNS, FREDERIC P.	Ch. Eng. State Board of Health, 13 Beacon st., Boston, Mass.	Oct. 2, 1878
STEARNS, IRVING A.	Man. Coal Companies Pennsylvania R. R. Co., Wilkes-Barre, Pa.	April 2, 1884
STEPHENS, CLINTON F.	2718 Mills st., St. Louis, Mo.	Sept. 5, 1877
STEVENS, FRANK S.	Div. Eng. Reading Div., Philadelphia & Reading R. R., Reading, Pa.	Oct. 3, 1883
STEVENS, HORACE E.	Eng. and Contractor, P. O. Box 2396, St. Paul, Minn.	J. Nov. 1, 1866 M. April 4, 1888
STEVENS, JOHN F.	Prin. Asst. Eng. G. N. Ry., Snohomish, Wash.	June 6, 1888
STEWART, JOHN M.	Asst. Eng. Dept. of Docks, Chambers st. office, New York City.	J. March 2, 1887 M. Jan. 4, 1888

Name.	Address.	Date of Membership.
STIXRUD, MARTINIUS	Cons. Eng., Seattle, Wash.	April 3, 1889
STONE, EDWARD HERBERT	Deputy Cons. Eng. for State Railways, Simla, India.	Dec. 5, 1888
STOREY, W. B., Jr.	Asst. Eng. S. P. Co., cor. 4th and Townsend sts., San Francisco, Cal.	Jan. 2, 1889
STOWELL, CHARLES F.	Civil Eng., Member of firm of The Am. Eng. and Insp. Assocn., Albany, N. Y.	April 4, 1888
STRIEDINGER, JULIUS H.	Flood Bldg., Room 89, San Francisco, Cal.	Feb. 2, 1876
STROBEL, CHARLES L.	Cons. Eng., 476 Elm st., Chicago, Ill.	Dec. 3, 1879
STRONG, CHARLES H.	Civil Eng. and Contractor, Cleveland, Ohio.	Jan. 8, 1873
STUART, A. A.	Eng. Main. Way and Cons., Brooklyn Elev. R. R., 31 Sands st., Brooklyn, N. Y.	Oct. 7, 1891
STUBBS, LINTON W.	Res. Eng. Vicksburg, Shreveport & Pacific and Alabama & Vicksburg R. Rs., Vicksburg, Miss.	Oct. 3, 1888
SWAIN, GEORGE FILLMORE	Prof. Civil Eng. Mass. Inst. } A. Sept. 5, 1883 Tech., and Eng. Mass. R. R. } M. March 2, 1892 Com., Boston, Mass.	
SWAN, CHARLES H.	Engineer's office, Met. Sewerage Com., 93 Lincoln st., Boston, Mass.	March 16, 1870
SWEET, ELNATHAN	13 Tenbroeck st., Albany, N. Y.	Nov. 6, 1878
SWEET, WILLIAM A.	Pres. Sweet Mfg. Co., Syracuse, N. Y.	Feb. 2, 1876
SWIFT, ALEX. J.	Ch. Eng. Delaware and Hudson Canal Co., Albany, N. Y.	Feb. 1, 1888
TALBOT, ARTHUR N.	Prof. Municipal Eng., University of Illinois, Champaign, Ill.	April 4, 1888
TALCOTT, COOK	136 Liberty st., Room 514, New York City.	April 15, 1868
TALCOTT, E. N. KIRK	Civil and Mech. Eng., Florida, Orange County, N. Y.	Jan. 29, 1868
TALCOTT, THOMAS M. R.	Cons. Eng. (Talcott & Whitcomb, Civil Engrs.), P. O. Box 109, Richmond, Va.	Sept. 1, 1886
TAYLOR, EDWARD B.	Gen. Supt. Trans., Penna. Lines, West of Pittsburgh, 1003 Penn. ave., Pittsburgh, Pa.	Sept. 3, 1884
TAYLOR, LUCIEN A.	Civil and Constructing Eng., U. S. Hotel, Boston, Mass.	Nov. 4, 1891
TAYLOR, NORTON L.	514 California Bldg., Tacoma, Wash.	Feb. 4, 1891
TEMPLE, ROBERT H.	1011 E. Marshall st., Richmond, Va.	May 6, 1885

Name.	Address.	Date of Membership.
TEMPLE, WILLIAM H. G.	Civil Eng., 65 Westminster st., Providence, R. I.	Feb. 3, 1892
THACHER, EDWIN	Bridge Eng. and Contractor, 455 West Jefferson st., Louisville, Ky.	Feb. 17, 1869
THACKRAY, GEORGE E.	Office Ch. Eng. Cambria Iron Co., Johnstown, Pa.	J. Sept. 6, 1882 M. April 7, 1886
THAYER, RUSSELL	Ch. Eng. and Supt. Fairmount Park, Cons. Eng., City Hall, Philadelphia, Pa.	Dec. 6, 1882
THOMAS, BENJAMIN F.	U. S. Asst. Eng., Louisa, Ky.	April 6, 1887
THOMAS, JOSEPH R.	Cons. Eng., 138 East 79th st., New York City.	Oct. 5, 1881
THOMPSON, BENJAMIN	Richardson Block, Room 125, Chattanooga, Tenn.	July 3, 1889
THOMPSON, GAYLORD	Prin. Asst. Eng. Otis Elev. Ry., Palenville, Green Co., N. Y.	April 2, 1890
THOMPSON, SAMUEL C.	Eng. Regulating, Grading and Paving Dept. St. Impvts., 23d and 24th Wards, office 2662 Third ave. (Residence, 832 East 161st st.), New York City.	Feb. 6, 1889
THOMPSON, WILLIAM G. M.	St. Catherine, Ontario, Canada.	July 2, 1879
THOMSON, GEORGE H.	Eng. Bridges New York Central & Hudson R. R. R.; Cons. Eng. Adirondack & St. Lawrence R. R., Room 48, Grand Central Station, New York City.	Feb. 2, 1887
THOMSON, JOHN	(Director.) Pres. Thomson Hydraulic Co., John Thomson Press Co., etc., 408-410 Temple Court Bldg., New York City.	March 2, 1887
THORNDIKE, JOHN L.	Lima, Peru. (Care of J. S. Spinney, 66½ Pine st., New York City.)	May 7, 1873
THURSTON, ROBERT H.	Director of Sibley College, Prof. Mech. Engineering, Cornell Univ., Ithaca, N. Y.	Dec. 6, 1871
TIDD, MARSHALL M.	Civil Eng., 10 Tremont st., Boston, Mass.	Oct. 2, 1878
TINGLEY, GEORGE C.	Eng. Union R. R., 18 Westminster st., Providence, R. I.	Sept. 6, 1871
TINKHAM, S. E.	Asst. Eng., Engineering Dept. City Hall, Boston, Mass.	March 2, 1892
TINTORER Y GIBERGA, JOSÉ	Civil Eng. Asalto 12, Barcelona, Spain.	May 5, 1880
TOBIAS, J. M.	Ch. Eng. C. T. & I. Co., Cartagena, U. S. Colombia.	Sept. 3, 1890
TODD, FRANK H.	Maricopa Loan and Trust Co., Phoenix, Ariz.	Feb. 6, 1889

Name.	Address.	Date of Membership.	
TOMLINSON, ALFRED T.	31 Sands st., Brooklyn, N. Y.	Sept.	7, 1887
TOMLINSON, SAM	(Care W. E. Moore), 69 St. Paul's road, Shipley, York, England.	April	6, 1892
TOMPKINS, JOHN A. B.	Div. Eng. Gt. Northern Ry., Wenat- chee, Wash.	Dec.	4, 1889
TOMPSON, GEORGE M.	Prin. Asst. Eng. N. Y., N. H. & H. R. R., P. O. Lock Box 14, Bridge- port, Conn.	May	2, 1888
TOWLE, STEVENSON	Cons. Eng., Dept. Public Works, 31 Chambers st., New York City.	Feb.	19, 1868
TOWNE, HENRY R.	President Yale & Towne Mfg. Co., Stamford, Conn.	Oct.	3, 1883
TRUESDELL, CHARLES	U. S. Asst. Eng., 1428 Arch st., Philadelphia, Pa.	Sept.	15, 1869
TUBBS, J. NELSON	Rochester, N. Y.	Sept.	3, 1884
TUCKER, HOOD	C. E. Cumberland Plateau Imp. Co., Deermont, Tenn.	Oct.	1, 1890
TULLOCK, ALONZO J.	Propr. Missouri Valley Bridge and Iron Works, Leavenworth, Kansas.	June	6, 1883
TURNER, E. K.	Civil Eng., 33 State st., Boston, Mass.	Nov.	4, 1891
TYSON, A. HARVEY	526 Court st., Reading, Pa.	Oct.	2, 1889
UNTHANK, ACHILLES W.	1201 Buena Vista st., Los Angeles, Cal.	July	2, 1873
VAN AUKEN, ALVA M.	Room 2, Rialto Bldg., Chicago, Ill.	Oct.	2, 1889
VAN BUREN, JOHN D.	Cons. Eng. Water Board, Newburgh, N. Y.	May	20, 1868
VAN BUREN, ROBERT	Ch. Eng. Dept. City Works, 153 Rensen st., Brooklyn, N. Y.	June	17, 1868
VANCE, HART	(Vance & Meddis, Civil Engs. and Surveyors), 223 Fourth ave., Louis- ville, Ky.	July	7, 1880
VANDERPOOL, EUGENE	Pres. and Eng. Newark Gas Light Co., Newark, N. J.	Sept.	2, 1874
VAN HOESEN, EDMUND F.	Res. Eng. N. Y. C. & H. R. R.R., Main Line and Branches, Utica to Buffalo, Rochester, N. Y.	July	1, 1891
VAN HORNE, JOHN G.	(Director.) Havemeyer Bldg., 7th Floor, 26 Cortlandt st., Rooms 16 and 17, New York City.	Feb.	4, 1880
VAN SANT, ROBERT L.	Hotel Bozier, 13th and Olive sts., St. Louis, Mo.	Sept.	3, 1884
VAN WINKLE, EDGAR B.	Litchfield, Conn.	Dec.	2, 1868
VARONA, IGNACIO M. DE	Municipal Bldg., Room 29, Brook- lyn, N. Y.	April	7, 1886

Name.	Address.	Date of Membership.	
VAUGHN, GEORGE W.	Ch. Eng. S. F. P. & P. Ry., Prescott, Ariz.	June	3, 1891
VEAZIE, JOSEPH	U. S. Asst. Eng., (P. O. Box 209), Boston, Mass.	May	3, 1876
VICTORIN, ANTHONY	Watervliet Arsenal, West Troy, N. Y.	Feb.	3, 1892
VON GELDERN, OTTO	Civil Eng., Room 56, Academy of Sciences, San Francisco, Cal.	May	4, 1892
VOORHEES, THEODORE	Gen. Supt. New York Central & Hudson River R. R., Grand Central Station, New York City.	May	6, 1885
WADDELL, JOHN A. L.	Cons. Bridge Eng., Keith & Perry Bldg., Kansas City, Mo.	Oct.	5, 1881
WAGNER, SAMUEL TOBIAS	Supt. of Shops, Phoenix Iron Co., Phoenixville, Pa.	Feb.	2, 1887
WAINWRIGHT, J.	111 Fourth ave., Pittsburgh, Pa.	Feb.	3, 1892
WAIT, JOHN C.	Cons. Eng., Harvard Univ. and Instr. in Lawrence Scientific School, Cambridge, Mass.	Feb.	3, 1892
WAITE, CHRISTOPHER CHAMPION	Pres. C. H. V. & T. Ry., Columbus, Ohio.	March	3, 1880
WALKER, J. S.	U. S. Engineer's Office, Nashville, Tenn.	Jan.	5, 1881
WALKER, J. W.	Pres. and Gen. Man. Shiffler Bridge Co., Pittsburgh, Pa.	May	7, 1884
WALKER, WILLIAM W.	Castile, N. Y.	Oct.	6, 1880
WALLACE, JOHN F.	Eng. Cons. Illinois Central R. R., 4315 Ellis Ave., Chicago, Ill.	June	2, 1886
WALLACE, J. H.	Asst. Main. Way, S. P. Co. (Pacific System), Fourth and Townsend sts., San Francisco, Cal.	Jan.	2, 1890
WALTON, C. W.	Eng. and Contractor, Detroit, Mich.	June	4, 1890
WARD, CHARLES D.	42 West 5th st., Oswego, N. Y.	March	3, 1869
WARD, JOHN F.	1919 Seventh ave., New York City.	Oct.	6, 1886
WARD, LEBBEUS B.	Taylor's Hotel, Jersey City, N. J.	March	16, 1870
WARE, R. WILLARD	Plainfield, N. J.	April	1, 1874
WARREN, WILLIAM HENRY	Challis Prof. Eng., Univ. Sidney, N. S. W., Australia.	Feb.	5, 1890
WASHBURN, FRANK S.	Purdy's Station, Westchester Co., N. Y.	Nov.	7, 1888
WATKINS, FREDERICK W.	Asst. Eng. Aqueduct Com., Yonkers, N. Y. (Residence, 118 East 115th st., New York City.)	Oct.	3, 1883
WATKINS, RICHARD	466 Castlereagh st., Prince Alfred Park, Sydney, N. S. W., Australia.	Dec.	3, 1890

Name.	Address.	Date of Membership.
WATSON, WILLIAM	107 Marlborough st., Boston, { A. Mass. } M.	March 1, 1882 Sept. 2, 1891
WATSON, WILLIAM P.	Ch. Eng. Seattle & Montana Ry., Seattle, Wash.	June 1, 1887
WAY, JAMES W.	Ch. Eng. Mo. P. Ry., St. L. I. M. & S. Ry., and Leased, Operated and Independent Lines, St. Louis, Mo.	Dec. 2, 1891
WEGMANN, EDWARD, Jr.	Div. Eng. New Croton Aqueduct, Englewood, N. J.	March 7, 1888
WEINIAGEN, F.	Eng. and Man. Wisconsin Bridge and Iron Co., San Antonio, Texas.	July 4, 1888
WEIR, FREDERICK C.	Pres. The Weir Frog Co., Cincinnati, Ohio.	Aug. 7, 1872
WEISKOPF, SAMUEL C.	(Care Carnegie Steel Co., Ltd.), { Keystone Bridge Works } J. Dept., 44 Wall st., New York City. { M.	May 7, 1884 Dec. 5, 1889
WELLINGTON, ARTHUR M.	Editor <i>Engineering News</i> , Tribune Building, New York City.	May 4, 1881
WELLMAN, DAVID WILLARD	Los Gatos, Cal.	Oct. 5, 1870
WELLS, CHARLES E.	Eng. with McArthur Bros. Contractors. (Address, Brink Haven, Ohio.)	June 1, 1892
WENTWORTH, CHARLES CHANCELLOR	Eng. and Man. American Bridge and Iron Co., Roanoke, Va.	April 4, 1888
WENTWORTH, WILLIAM HENRY	Pres. Refugio & Concepcion Mining Co., Monterey, Mexico.	Jan. 2, 1889
WESTINGHOUSE, GEORGE, Jr.	Pittsburgh, Pa.	Jan. 7, 1891
WESTON, EDMUND B.	Asst. City Engineer in charge of Water Dept. (Lock Box 1071), Providence, R. I.	Dec. 6, 1882
WETHERILL, W. C.	Gen. Man. Empire Zinc Co., Joplin, Mo.	Dec. 1, 1886
WHEELER, E. S.	Asst. Eng., Sault Ste. Marie, Mich.	Nov. 7, 1883
WHEELER, LEVI L.	U. S. Asst. Eng., Illinois and Miss. Canal, Milan, Ill.	June 4, 1884
WHEELER, ORLANDO B.	U. S. Asst. Eng., 1515 Lucas pl., St. Louis, Mo.	Nov. 2, 1887
WHEELER, SCHUYLER S.	Pres. Crocker-Wheeler Elec. Co., 430 West 14th st.; Electrical Expert Board Electrical Control, 1266 Broadway, New York City. { J. { M.	March 2, 1887 Feb. 6, 1889
WHINERY, SAMUEL	(Vice-President.) Vice-Pres. Warren-Scharf Asphalt Paving Co., 61 Blymyer Bldg., Cincinnati, Ohio. { J. { M.	April 1, 1874 May 4, 1881

Name.	Address.	Date of Membership.
WHISTLER, THOMAS D.	2 West Biddle st., Baltimore, Md.	{ J. March 5, 1884 M. May 2, 1888
WHITCOMB, HENRY D.	Asst. Eng. James River Impvt., Richmond, Va.	Feb. 21, 1872
WHITE, GEORGE H.	Prof. Civil. Eng., Worcester Pol. Inst., 20 Shattuck st., Worcester, Mass.	May 2, 1883
WHITE, HENRY F.	Ch. Eng. B. C. R. & N. Ry., Cedar Rapids, Iowa.	Jan. 2, 1890
WHITE, T. S.	Vice-Pres. and Ch. Eng. Penn. Bridge Co., Beaver Falls, Pa.	April 3, 1889
WHITE, W. HOWARD	Civil Eng., Redlands, Cal.	March 5, 1873
WHITFORD, OSCAR F.	43 Church st., Buffalo, N. Y.	Dec. 6, 1871
WHITLOCK, FRANK W.	Civil Eng., Great Barrington, Mass.	{ J. Oct. 4, 1876 M. April 1, 1885
WHITNEY, FRANK O.	City Hall, Boston, Mass.	{ J. May 3, 1876 M. Jan. 5, 1887
WHITTEMORE, DON J.	(<i>Past-President.</i>) Ch. Eng. Chicago, Milwaukee & St. Paul Ry., office 603 Rand & McNally Bldg., Chicago, Ill. (Residence, 222 Biddle st., Milwaukee, Wis.)	July 10, 1872
WHITTEN, NATHAN H.	Eng. Holyoke Machine Co., Holyoke, Mass.	Jan. 7, 1876
WILDER, FRANCIS M.	230 Niagara st., Buffalo, N. Y.	Jan. 5, 1881
WILEY, WILLIAM H.	Civil Eng., 53 East 10th st., New York City.	Feb. 17, 1869
WILKINS, WILLIAM GLYDE	(Wilkinson & Davidson, Civil Engs.), 90 Westinghouse Bldg., Pittsburgh, Pa.	Dec. 4, 1889
WILLARD, JAMES E.	Civil Eng. and Contractor, Crescent Hill, Ky.	May 1, 1889
WILLIAMS, EDWARD H.	(Burnham, Parry, Williams & Co.), Baldwin Locomotive Works, 500 North Broad st., Philadelphia, Pa.	Sept. 5, 1883
WILLIAMSON, F. STUART	Civil and Mech. Eng., (care Rapid Transit Comm.), 22 William st., New York City.	Sept. 7, 1887
WILLIAMSON, WILLIAM GARNETT	Asst. Eng. Elk Riv. Div. M. S. Canal, Wheeler, Ala.	April 4, 1883
WILSON, CHARLES A.	Ch. Eng. W. & L. E. Ry., Toledo, Ohio.	April 1, 1891
WILSON, ELLIOTT H.	(Wilson & Gillie, Civil and Min. Engs.), Butte, Mont.	Feb. 1, 1888
WILSON, GEORGE L.	Asst. City Eng. and Supt. of Sewers, St. Paul, Minn.	Feb. 5, 1890

Name.	Address.	Date of Membership.
WILSON, HENRY W.	Civil. Eng., Drexel Bldg., Philadelphia, Pa.	Sept. 6, 1876
WILSON, HERBERT M.	Irrigation Eng. U.S. Geological Survey, Washington, D. C. { J.	Sept. 5, 1883
	{ M.	Jan. 2, 1890
WILSON, JOHN A.	Civil Eng., 1036 Drexel Bldg., Philadelphia, Pa.	June 7, 1876
WILSON, JOSEPH M.	Civil Eng. and Architect, Drexel Bldg., Philadelphia, Pa.	April 2, 1873
WIMMER, SEBASTIEN	Civil Eng., St. Vincent, Beatty P. O., Westmoreland Co., Pa.	March 2, 1881
WISNER, GEORGE Y.	Civil and Cons. Eng., 39 West Canfield ave., Detroit, Mich.	April 5, 1876
WOLCOTT, CHRISTOPHER C.	Civ. Eng. U. S. N., U. S. Navy Yard, League Island, Pa.	March 5, 1894
WOOD, JOSEPH	Gen. Man. Penna. Lines West of Pittsburgh, Pittsburgh, Pa.	April 1, 1874
WOODBURY, CHARLES J. H.	Vice-Pres. Boston Mfrs. Mutual Fire Ins. Co., 31 Milk st., Boston, Mass.	Dec. 3, 1884
WOODFORD, ETHELBERT G.	(Address unknown.)	June 4, 1890
WORTHEN, WILLIAM E.	(Past-President.) Civil Eng., 63 Bleecker st., New York City.	Dec. 4, 1867
WRIGHT, AUGUSTINE W.	Vice-Pres. Siemens and Halske Co. of America, Cons. Eng., 1217 Monadnock Bldg., Chicago, Ill.	May 5, 1886
WRIGHT, CHARLES H.	506 West 5th st., Wilmington, Del.	Oct. 5, 1892
WRIGHT, EDWARD T.	Abstract Bldg., Los Angeles, Cal.	Feb. 3, 1886
WROTNOWSKI, ARTHUR F.	Res. Eng., Tampico Harbor Works, Tampico, Mexico.	July 12, 1877
WÜRTELE, ARTHUR S. C.	19 Jay st., Albany, N. Y.	March 5, 1873
YEATMAN, CHARLES P.	Civil Eng., Grand View, Tenn.	Feb. 2, 1887
YEATMAN, MORGAN E.	Roanoke, Va.	May 4, 1892
YONGE, SAMUEL H.	Div. Eng. Mo. Riv. Com., N. W. Cor. 6th and Wyandotte sts., Kansas City, Mo.	May 5, 1880
YOUNG, JOHN	Geneseo, N. Y.	March 7, 1888

ASSOCIATE MEMBERS.

[Assoc. M. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOTT, FREDERICK WILLIAM	Ch. Eng. Tequitquiac Tunnel, Zumpango, Mexico.	Oct. 7, 1891
ALLEN, HENRY C.	City Eng., Syracuse, N. Y.	July 1, 1891
ANGIER, W. E.	West Swanzey, N. H.	Sept. 7, 1892
ARENTZ, F. C. H.	Eng. and Contracting Agent (Arentz & Diver), Youngstown Bridge Co., Room 41, Hathaway Bldg., Milwaukee, Wis.; Box 422, Harrisburg, Pa.	May 6, 1891
AYCRIGG, WILLIAM A.	Civil Eng., 32 Warren and 102 Chambers sts., New York City.	May 4, 1892
BAIER, JULIUS	Asst. Eng. St. Louis Merchants' Bridge Terminal Ry., 52 Laclède Bldg., St. Louis, Mo.	J. Sept. 7, 1887 Assoc. M. June 1, 1892
BARNEY, SAMUEL E., JR.	Instr. in C. E. Sheffield Sci. School, Yale Univ., 346 Whitney ave., New Haven, Conn.	J. June 2, 1886 Assoc. M. Feb. 3, 1892
BOWMAN, A. L.	P. O. Box 323, Roanoke, Va.	Sept. 7, 1892
CAPLES, MARTIN J.	Asst. Eng. Main. Way Radford Div., N. & W. R. R., Radford, Va.	Nov. 4, 1891
CARLL, DAVID S.	Asst. Eng. W. & G. Ry., Georgetown, D. C.	J. March 7, 1888 Assoc. M. July 1, 1891
CARR, ALBERT	Div. Eng. B'way Cable road, 22 Sanford st., East Orange, N. J.	March 2, 1892
CARROLL, EUGENE	Res. Eng., and Supt. Water Co., Butte, Mont.	J. June 4, 1888 Assoc. M. July 1, 1891
CATTELL, WILLIAM A.	Asst. Ch. Eng. Long Island R. R., Long Island City, N. Y.	May 6, 1891

Name.	Address.	Date of Membership.	
CHAPIN, LOOMIS E.	City Eng., City Hall, { J. Canton, Ohio. { Assoc. M.	Dec.	3, 1884
CLAPP, GEORGE H.	Of the firm Hunt & Clapp, Proprs. Pittsburgh Testing Laboratory, 116 Water st., Pittsburgh, Pa.	Sept.	7, 1892
COCEROFT, C. A.	Box 171, Walden, Orange Co., N. Y.	July	1, 1891
COLE, HOWARD J.	Asst. Eng. Harlem River Bridge Com., 71 Broadway, New York City.	Jan.	6, 1892
CONNOR, EDWARD H.	Asst. Eng. with E. L. Corthell, 902 The { J. Temple, Chicago, Ill. { Assoc. M.	Feb.	5, 1890
CONOVER, ALLAN D.	Madison, Wis. { J. { Assoc. M.	Feb.	3, 1892
CONVERSE, W. H.	Bridge Eng. and Contractor, Chatta- nooga, Tenn.	June	4, 1884
CUMMINGS, ROBERT AUGUSTUS	Asst. Eng. in chg. of Columbus Terminal { J. N. & W. R. R., Col- { Assoc. M.	Feb.	3, 1892
CUNNINGHAM, A. C.	Member of The Am. Engr. and Inspn. Assoen., 25 N. Pearl st., Albany, N. Y.	Oct.	1, 1890
CUSHING, WILLIAM C.	Eng. Main. Way Ind. { J. Div. P. C. C. St. L. { Assoc. M.	May	4, 1892
	Ry., Indianapolis, Ind. {	Nov.	4, 1891
DUNN, EMMETT C.	Eng. Main. Way, Va. Midland Div. R. & D. R. R., Alexandria, Va.	Sept.	2, 1892
EARL, GEORGE GOODELL	Ch. Eng. New Orleans Sewerage Survey and Plans, 61 Carondelet st., New Orleans, La. { J. { Assoc. M.	June	5, 1889
EASBY, M. WARD	Asst. Eng. Cambria Iron Co., 36 Potts st., Johnstown, Pa.	Nov.	4, 1891
ELDRIDGE, G. M.	City Eng. and Supt. Water Works, Americus, Ga.	Nov.	4, 1891
ELLIOTT, JOHN S.	Jamaica Ry. Extension, Montego Bay, Jamaica, West Indies.	June	1, 1892
ENGSTRÖM, FRANS	Asst. Eng. Penna. Co., Pittsburgh, Pa.	April	6, 1892
ENLANDSEN, OSCAR	328 East 86th st., New { J. York City. { Assoc. M.	May	1, 1889
EWING, W. B.	Eng. Chicago Heights { J. Land Assoen., 4136 { Assoc. M.	Dec.	2, 1891
	Ellis ave., Chicago, Ill. {	April	3, 1889
		Feb.	3, 1892

Name.	Address.	Date of Membership.	
FARLEY, J. M.	White Plains, N. Y.	{ J. Dec. 5, 1888	{ Assoc. M. July 1, 1891
FISHER, JANON	Res. Eng. Balto. Belt R. R., 905 Cathedral st., Baltimore, Md.	May 4, 1892	
FOCHT, LOUIS	Asst. Eng. Lehigh Valley R. R., South Bethlehem, Pa.	May 4, 1892	
FREASE, HARRY	The Canton Stoneware Co., Canton, Ohio.	May 6, 1891	
FREYHOLD, FELIX	Draftsman Bureau Yards and Docks, Navy Dept., 236 First st. S. E., Washington, D. C.	Sept. 2, 1891	
GAHAGAN, WALTER H.	(Care E. L. Corthell), { J. Sept. 5, 1888	{ Assoc. M. July 1, 1891	
	The Temple, Chicago, Ill.		
GARDNER, MARTIN L.	Asst. to Eng. Main. Way P. R. R., Jersey City, N. J. (Residence 80 Fourth ave., Newark, N. J.)	Sept. 2, 1891	
GARRISON, F. LYNNWOOD	328 Chestnut st., Philadelphia, Pa.	Sept. 7, 1892	
GIFFORD, GEORGE E.	Prin. Asst. Eng. The King Bridge Co., Cleveland, Ohio.	Oct. 7, 1891	
GODDARD, L. W.	U. S. Asst. Eng., U. S. Eng. Office, Grand Rapids, Mich.	March 2, 1892	
GOING, ALVAH S.	Box 345, Victoria, B. C.	May 4, 1892	
GRANT, THOMAS H.	Red Bank, N. J.	May 6, 1891	
HARDY, HARRY	(Care Read & Campbell), Puebla, Mexico.	June 1, 1892	
HASBROUCK, CHARLES A.	Prin. Asst. Eng. Am. Bridge Works, cor. { J. March 7, 1887	{ Assoc. M. Feb. 3, 1892	
	40th and Stewart ave., Chicago, Ill.		
HAWLEY, WM. CHAUNCEY	1625 Monadnock Bldg., { J. Oct. 1, 1890	{ Assoc. M. April 6, 1892	
	Chicago, Ill.		
HEALY, JOHN F.	Asst. Eng. A. G. S. & { J. Jan. 2, 1890	{ Assoc. M. June 3, 1891	
	N. O. & N. E. Rys., Birmingham, Ala.		
HEMMING, D. W.	12 E. Huntingdon ave., Baltimore, Md.	Sept. 7, 1892	
HILL, JOHN EDWARD	9 East Buffalo st., Ithaca, N. Y.	May 4, 1892	
HOUSTON, JOHN J. L.	814 N. 21st st., Philadelphia, Pa.	May 4, 1892	
HUMPHREY, WILLIAM S.	Bridge Eng. M. K. & T. Ry., Parsons, Kans.	Sept. 2, 1891	
HUTCHINSON, GEORGE HUNT	Asst. Eng. Keystone Bridge Works, Pittsburgh, Pa.	Sept. 2, 1891	

Name.	Address.	Date of Membership,	
JANNEY, WILLIAM D.	Div. Eng. Norfolk & Western R. R., Ohio Ex., Ceredo, W. Va.	May	6, 1891
JORDAN, WILLIAM F.	Asst. Eng. Buffalo, Rochester & Pittsburgh R. R., Rochester, N. Y.	April	1, 1891
KERR, HENRY H.	City Eng., Fort Worth, Tex.	March	2, 1892
KIRKPATRICK, WALTER G.	(Landreth & Kirkpatrick, Civil Engs.), 4 Berry Block, Nashville, Tenn.	April	6, 1892
KYLE, GEORGE A.	Asst. Eng., N. P. R. R., Tacoma, Wash.	Feb.	3, 1892
LAMB, RICHARD	Ch. Eng., W. O. & E. C. R. R., Lambert's Pt. Co., and Lyndhaven Syndicate, 1 Broadway, New York City.	May	6, 1891
LYTE, FRANCIS A.	Kane, Pa.	Oct.	5, 1892
MCCALLA, R. C., Jr.	U. S. Asst. Eng., Black Warrior River Impvt., Tuscaloosa, Ala.	July	2, 1890
MEAD, DANIEL W.	Eng. and Gen. Man. Rockford Constr. Co., Rockford, Ill.	Sept.	2, 1891
MITCHELL, EDWIN	Asst. Eng. Cumberland Valley R. R., Cham- bersburg, Pa.	July	1, 1891
MODJESKI, RALPH	Civil Eng., 218 La Salle st., Chicago, Ill.	Sept.	7, 1887
MOFFET, JAMES D.	Asst. Eng. Main. Way Pulaski and North Carolina Divs., N. & W. R. R., Radford, Va.	April	6, 1892
MORAN, DANIEL E.	Civil Eng., Sooy Smith & Co., 2 Nassau st., New York City.	Dec.	1, 1886
MORLEY, FRED.	Instructor Engineering Dept., Michi- gan University, Ann Arbor, Mich.	July	1, 1891
OSTRANDER, JOHN E.	Prof. Civil Eng., Univ. Idaho, Moscow, Idaho.	Nov.	4, 1891
PARSONS, SIDNEY AUSTIN	First Asst. Eng. Everett Land Co., Everett, Wash.	May	2, 1888
PENNYPACKER, LEVIS P.	113 West 35th st., New York City.	May	2, 1891
PERKINS, THOMAS A.	Civil Eng., P. O. Box 316, Ogden, Utah.	Sept.	2, 1891

Name.	Address.	Date of Membership.	
PORTER, ALBERT H.	Res. Eng. Cataract Cons. Co., Niagara Falls, N. Y.	{ J. July 4, 1888	{ Assoc. M. July 1, 1891
PORTER, JAMES MADISON	Prof. Civil Eng., Lafayette College, 53 N. 3d st., Easton, Pa.	May 4, 1892	
POTTER, ALEXANDER	Civil and San. Eng., Olean, N. Y.	{ J. Jan. 4, 1888	{ Assoc. M. Jan. 6, 1892
REYNDERS, J. V. W.	Eng. in charge Bridge and Cons. Dept., Penna. Steel Co., P. O. Box 119, Harrisburg, Pa.	June 1, 1892	
ROBERTS, NATHANIEL	Ch. Eng. Wallis Iron Works, 192 Broadway, New York. (Residence 73 Prescott pl., Jersey City Heights, N. J.	Nov. 4, 1891	
ROSENBERG, FRIEDRICH	Gen. Man. Bessemer Ditch Co., Eng. Colo. Coal and Iron Co., Pueblo, Colo.	{ J. Oct. 2, 1889	{ Assoc. M. Jan. 6, 1892
ROSS, ELMER W.	Asst. Eng. Bridge Dept., City Engr.'s Office, Providence, R. I.	{ J. March 5, 1890	{ Assoc. M. June 1, 1892
SHERWOOD, GEORGE W.	Civil Eng., Riverside, Cal.	{ J. Nov. 6, 1889	{ Assoc. M. Oct. 5, 1892
SISSON, WILLIAM LEE	Asst. Eng. B. & O. R. R., Harper's Ferry, W. Va.	{ J. June 4, 1890	{ Assoc. M. July 1, 1891
SMITH, ALBERT	Eng. in charge Sewer and Pavement Cons., Monongahela, Pa. (Address, Saltsburg, Pa.)	Jan. 6, 1892	
SMITH, J. WALDO	First Asst. Eng. East Jersey Water Co., Montclair, N. J.	Oct. 5, 1892	
STARRETT, THEODORE	Eng. and Contractor, 374 The Rookery, Chicago, Ill.	May 6, 1891	
STITES, A. C.	Eng. Phoenix Iron Co., Eng. Phoenix Bridge Co., The Rookery, Chicago, Ill.	{ J. Dec. 3, 1890	{ Assoc. M. Nov. 4, 1891
STOUT, EDMUND COFFIN	Civil and Topog. Eng., and City Surveyor, 42 Broadway, New York City.	May 6, 1891	
STRACHAN, JOSEPH	Asst. Eng. Dept. City Works, 41 Municipal Bldg., Brooklyn, N. Y.	May 4, 1892	
THAYER, WILLIAM W.	City Surveyor Fourth Dist., 724 Spring Garden st., Philadelphia, Pa.	Dec. 2, 1891	

ASSOCIATE MEMBERS.

Name.	Address.	Date of Membership.	
THOMSON, T. KENNARD	445 Fifth st., Brooklyn, { N. Y. {	J. Oct. 3, 1888	Assoc. M. June 3, 1891
TOLTZ, MAX	Bridge Eng. G. N. Ry., St. Paul, Minn.	Sept. 7, 1892	
TRATMAN, E. E. RUSSELL	103 Tribune Bldg., New { York City. {	J. April 7, 1886	Assoc. M. July 1, 1891
TRIBUS, LOUIS L.	84 Warren st., New York { City. {	J. April 4, 1888	Assoc. M. June 1, 1892
URQUHART, GEORGE C.	Asst. Eng., Pittsburgh Div., Pitts- burgh, Cincinnati, Chicago & St. Louis Ry., Steubenville, Ohio.	May 6, 1891	
VIELÉ, MAURICE A.	Asst. Eng. New Croton { Aqueduct Comm., 476 { West 152d st. New York { City. {	J. Feb. 4, 1891	Assoc. M. Sept. 7, 1892
VON GEMMINGEN, SIGMUND	Asst. Eng., C. & O. Ry., Newport News, Va.	May 6, 1891	
VOORHEES, PAUL	(Voorhees & Witmer), Rooms 65 and 66, Chapin Block, Buffalo, N. Y.	Feb. 3, 1892	
WALKER, CLEMENT I.	Asst. Eng. Consolidated Telegraph and Electrical Subway Co., 113 W. 38th st., New York City.	April 1, 1891	
WARNER, EDWIN HALL	Bailey Bldg., Seattle, Wash.	May 6, 1891	
WASHINGTON, WM. DE H.	145 Broadway, New York City.	Oct. 5, 1892	
WEBB, WALTER LORING	Instructor, Dept. Civil Eng., Univ. Penn., 3344 Lancaster ave., Phila- delphia, Pa.	May 4, 1892	
WEBSTER, ALBERT LOWRY	Civil and San. Eng., { 107 Drexel Bldg., { Wall and Broad sts., { New York City. {	J. Sept. 6, 1882	Assoc. M. June 3, 1891
WEBSTER, GEORGE S.	Survey Bureau, City Hall, Phila- delphia, Pa.	Sept. 7, 1892	
WERNER, EMRICK A.	Civil Eng., 44 Pierce st., Chicago, Ill.	Sept. 2, 1891	
WHEELER, HARRY ROBERTS	(Care Babcock, Lary & { Co.) Newburgh, N. Y. {	J. April 4, 1888	Assoc. M. May 4, 1892
WHITTEMORE, W. F.	1111 Garden st., Hobo- { ken, N. J. {	J. March 6, 1889	Assoc. M. April 6, 1892
WILKES, JAMES K.	City Eng., Room 6, City Hall, Dan- bury, Conn.	June 3, 1891	
WILLARD, J. MILTON	Willow Springs, Ill.	Nov. 4, 1891	
WÜLFEL, PAUL L.	Asst. Ch. Eng. Pencoyd { Iron Works, Bridge { and Cons. Dept., { Pencoyd, Pa. {	J. July 3, 1889	Assoc. M. July 1, 1891

ASSOCIATES.

[Assoc. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOTT, WILLIAM L.	Chairman Carnegie, Phipps & Co. (Ltd.), 42 5th ave., Pittsburgh, Pa.	May 1, 1889
BARNES, WILLIAM H.	Pres. Allegheny Valley Ry., 234 South 4th st., Philadelphia, Pa.	Sept. 2, 1885
BOGART, SAMUEL S.	Edison Gen. Elec. office, Broad st., New York City. (Residence, Schraalenburgh, N. J.)	April 7, 1886
BRADBURY, HENRY R.	Secy. Warren-Scharf Asphalt Paving Co., 81 Fulton st., New York City.	July 1, 1881
BRADLEY, CHARLES WHITING	Gen. Supt., West Shore R. R., West 42d st. Ferry, New York City.	June 19, 1891
BREUCHAUD, JULES	Yonkers, N. Y.	June 5, 1889
BROWN, JACOB B.	P. O. Box 501, Newport, R. I.	Sept. 6, 1871
BURNHAM, GEORGE, JR.	500 North Broad st., Phila- } J. delphia, Pa. } Assoc.	Jan. 6, 1875 July 2, 1890
BURROWS, GEORGE L.	Saginaw, Mich.	Feb. 3, 1886
CARD, JOSEPH P.	Pres. Chicago Tie Preserving Co., 15th and Clark sts., Chicago, Ill.	Sept. 5, 1883
CLARK, LUDLOW V., JR.	505 Chestnut st., Philadelphia, Pa.	Oct. 4, 1892
COMER, H.	Supt. Lehigh Valley Creosoting Co., Washington st., Jersey City, N. J.	May 5, 1891
COMFORT, SILAS G.	Prof. Civil. Eng. and Astronomy, Penna. Military Academy, Ches- ter, Pa.	March 31, 1891
COMPTON, ALFRED G.	Prof. of Applied Mathematics in The College of the City of New York, 40 West 126th st., New York City.	Sept. 5, 1877
CRAFTS, GEORGE H.	Civil Eng. and Contractor, Box 245, Atlanta, Ga.	April 4, 1888
DAVIS, J. WOODBRIDGE	Principal Woodbridge School, 645 Madison ave., New York City.	June 3, 1885
DIVEN, JOHN M.	Supt. and Treas. Water Works Co., Elmira, N. Y.	Sept. 10, 1891

Name,	Address,	Date of Membership.
Du Barry, Edmund L.	Supt. Norfolk Div., Norfolk & Western R. R., Crewe, Va.	Jan. 6, 1875
Dunn, James R.	40 Wall st., New York City.	March 31, 1891
Ely, George H.	Pres. Central National Bank, Cleveland, Ohio.	May 31, 1892
Fisk, Wilbur C.	28 Nassau st., New York City.	Oct. 4, 1892
Fletcher, Robert	Prof. of Civil Eng., Director Thayer School of Civil Engineering, Dartmouth College, Hanover, N. H.	Nov. 4, 1874
Frost, George Henry	Publisher <i>Engineering News</i> , 154 Nassau st., New York City.	Jan. 4, 1882
Futami, Kyosaburo	Ch. Eng. Fukniken, Fukin, Japan. (Address, Kobe Paper Mill Co., Kobe, Japan.)	June 5, 1889
Gibson, William, Jr.	Publisher <i>The Engineering Record</i> , 277 Pearl st., New York City.	Sept. 5, 1888
Goodelle, John M.	120 Madison ave., New York City.	July 29, 1891
Goodman, Edward H.	Vice-Pres. and Gen. Man. The Union Switch and Signal Co., Swissvale, Pa.	June 4, 1891
Griffin, P. H.	Pres. New York Car Wheel Works, Buffalo, N. Y.	Oct. 1, 1890
Hall, Clayton C.	Cons. Actuary, Actuary Maryland Life Ins. Co., 10 South st., Baltimore, Md.	March 3, 1886
Hammond, Henry B.	Glen Ridge, N. J.	July 7, 1880
Handy, Frank W.	Architect, 32 Metropolitan Block, Chicago, Ill.	Oct. 6, 1886
Hardwicke, Alan H. G.	Man. Hardwick Heating Co., Buffalo, N. Y.	June 4, 1884
Harris, Charles M.	92 Broadway, New York City.	Jan. 8, 1873
Hazen, John V.	Prof. Civ. Eng., Chandler Sci. School, Dartmouth College, Hanover, N. H.	June 5, 1889
Hendrie, John S.	Contractor, Hamilton, Ontario, Canada.	Sept. 7, 1881
Howe, Malvered A.	Prof. Civil Eng., Rose Pol. Inst., 637 Cherry st., Terre Haute, Ind.	May 7, 1890
Hunsiker, Millard	Eng. of Tests, The Carnegie Steel Co. (Ltd.), Pittsburgh, Pa.	June 5, 1889

Name.	Address.	Date of Membership.	
JACOBY, HENRY S.	Asst. Prof. in charge of Bridge Eng. and Graphics, Cornell University, 3 Quarry st., Ithaca, N. Y.	Nov.	5, 1890
KARNER, WILLIAM J.	The Temple, 184 La Salle St., Chicago, Ill.	July	2, 1890
KING, H. W.	Secy. The King Bridge Co., Cleveland, Ohio.	June	19, 1891
LEWIS, FRANK C.	Ch. Eng. Columbus Bridge Co., Columbus, Ohio.	June	5, 1889
LEWIS, JAMES F.	Rand Drill Co., 23 Park Place, New York City.	Feb.	6, 1889
LINDENBERGER, CASSIUS H.	Wayne Hotel, Detroit, Mich.	Feb.	2, 1892
LIVINGSTON, J. I.	Man. Standard Paint Co., Bound Brook, N. J.	July	3, 1889
MARRIOTT, CLARENCE BOYD	City Cement Inspector, 106 E. Saratoga st., Baltimore, Md.	May	3, 1892
McKINNEY, ROBERT C.	Secy. and Treas. Niles Tool Works, Hamilton, Ohio.	Oct.	6, 1886
MILLER, SPENCER,	Eng. Lidgerwood Mfg. Co., 96 Liberty st., New York City.	July	3, 1889
MOXHAM, ARTHUR J.	Pres. Johnson Steel Street Rail Co., Johnstown, Pa.	Nov.	2, 1887
NICOL, THOMAS W.	Ch. Eng. Mobile, Jackson & Kansas City R. R., 64 St. Francis st., Mobile, Ala.	June	7, 1882
OASTLER, WM. CHURCHILL	Cons. Eng. on Highways, 43 Exchange Place, New York City.	March	31, 1891
PARSONS, GEORGE W.	Supt. Frog Switch and Signal Dept., Pennsylvania Steel Co., Steelton, Pa.	Sept.	3, 1884
PHILLIPS, HENRY A.	Exchange Bldg., Room 409, Boston, Mass.	April	7, 1886
POMEROY, LEWIS R.	29 Broadway, New York City.	April	2, 1890
PRATT, ROBERT J.	Treas. and Man. Electric Mfg. and Gas Engine Co., Greenbush, N. Y.	May	4, 1877

Name.	Address.	Date of Membership.
PUTNAM, JOSEPH W.	Civil Eng. and Gen. Contractor, P. O. 253, New Orleans, La.	March 3, 1880
REEVES, PAUL S.	760 South Broad st., Philadelphia, Pa.	Sept. 6, 1882
RICHARDS, JOSEPH R.	Architect, 55 Kilby st., Boston, Mass.	Feb. 4, 1880
RICHARDSON, CLIFFORD	Office of Engr. Commr. Dist. of Columbia, Washington, D. C.	Oct. 4, 1892
ROBERTS, WILLIAM	Waltham, Mass.	June 4, 1884
SMITH, F. HOPKINSON	16 Exchange pl., New York City.	April 5, 1892
SMITH, HERBERT STEARNS SQUIER	Civil Eng., Asst. Prof. Civil Eng., Princeton College, Princeton, N. J.	Sept. 10, 1891
SPEED, JAMES B.	Pres. Western Cement Co., Louis- ville, Ky.	May 2, 1888
STONE, WATERMAN	Gen. Man. Interstate Consolidated Rapid Transit Ry., Kansas City, Kans.	Dec. 1, 1886
TOMKINS, CALVIN	150 Broadway, New York City.	Jan. 6, 1886
TRAUTWINE, JOHN C., Jr.	3301 Haverford st., Philadelphia, Pa.	Dec. 5, 1888
WARDER, J. H.	Inspecting Eng., 617 Rand & Mc- Nally Bldg., Chicago, Ill.	March 7, 1888
WATKINS, J. ELFRETH	Curator Section Transportation and Engineering and Eng. Property, U. S. National Museum, Washing- ton, D. C.	Jan. 2, 1889
WOODWARD, C. M.	Thayer Prof. of Applied Mechanics and Higher Mathematics, Dean of Polytechnic School, Washington, Univ., St. Louis, Mo.	June 2, 1886
WILLSON, FREDERICK NEWTON	Prof. of Descriptive Geom- etry, Stereotomy and Technical Drawing in the John C. Green School of Science, Princeton, N. J.	J. Sept. 5, 1883 Assoc. Oct. 4, 1892
YOUNG, FREDERICK S.	Asst. to Pres., and Secy. Gilbert Car Mfg. Co., Troy Club, Troy, N. Y.	April 7, 1886

JUNIORS.

[Jun. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ABBOTT, ARTHUR V.	North Ave. Ry. Co., Blackstone Bldg., Baltimore, Md.	Jan. 5, 1881
ABBOTT, EDWARD L.	Civil Eng., 119 La Salle st., Chicago, Ill.	Sept. 1, 1886
ADAMS, JULIUS L.	Adams Eng. Co., Gate City Bank Bldg., Atlanta, Ga.	Jan. 4, 1888
ALLEN, THOMAS W.	City Surv., with Title Guarantee Co., 183 West 73d st., New York City.	Dec. 5, 1888
ANDERSON, JAMES C.	Cor. Hinsdale & Sutter aves., Brook- lyn, N. Y.	Sept. 10, 1891
BABB, CYRUS C.	Asst. Topographer, U. S. Geological Survey, Washington, D. C.	Feb. 2, 1892
BAINBRIDGE, FRANCIS H.	Asst. Eng. Edge Moor Bridge Works, Wilmington, Del.	Jan. 4, 1888
BARNESLEY, GEORGE T.	Asst. Eng. N. & W. R. R., Dingess, W. Va.	May 31, 1892
BASCOME, WESTERN RADFORD	Asst. Eng. St. Louis Merchants' Bridge Term. Ry., 52 Laeledge Bldg., St. Louis, Mo.	Dec. 3, 1891
BAUM, GEORGE	Civil Eng., (care C. W. Hunt Co.), 45 Broadway, New York City.	Jan. 4, 1882
BEARD, E. H.	Asst. Supervisor P. & R. R.R., 411 N. 13th st., Philadelphia, Pa.	Sept. 10, 1891
BEHRENS, WILLIAM F.	Civil Eng., P. O. Box 676, Albu- querque, N. M.	Nov. 6, 1889
BELKNAP, WILLIAM E.	(Care Eng. Main. Way, P. R. R.), Altoona, Pa.	March 31, 1891
BELL, GILBERT J.	1414 Froost ave., Kansas City, Mo.	Sept. 7, 1887
BERRALL, JAMES	P. O. Box 742, Montclair, N. J.	May 5, 1891
BETTES, CHARLES R.	(Care Charles B. Brush), 1 Newark st., Hoboken, N. J.	Oct. 1, 1890
BEUGLER, EDWIN J.	Asst. Eng. Philadelphia & Reading R. R., 112 Douglass st., Reading, Pa.	June 19, 1891
BLAKELEY, GEORGE H.	Ch. Eng. Passaic Rolling Mill Co., Paterson, N. J.	Dec. 4, 1889

Name.	Address.	Date of Membership.
BLANC, FREDERICK N.	Pres. "Litofuge" Mfg. Co., 62 John st., New York City.	July 5, 1882
BLODGETT, JOHN	Boston Bridge Works, East Cambridge, Mass.	Dec. 4, 1889
BLUNT, R. ALLAN	Office Director-Gen. of Rys., Simla, Punjab, India.	June 4, 1891
BOECKLIN, WERNER	228 West 38th st., New York City.	March 1, 1892
BOGART, JAMES P.	291 Washington ave., Bridgeport, Conn.	Jan. 4, 1882
BOGGS, EDWARD M.	Prof. Irrigation Eng. and Mathematics, Univ. Arizona, Tucson, Ariz.	Oct. 6, 1886
BONNETT, CHARLES P.	421 Westminster ave., Elizabeth, N. J.	June 2, 1886
BONNETT, LOUIS B.	Contributor to <i>Railroad Gazette</i> , 414 S. Broad st., Elizabeth, N. J.	May 3, 1892
BOOTH, WILLIAM F.	Poughkeepsie, N. Y.	Jan. 7, 1885
BOWDITCH, ERNEST W.	Landscape Gardener and Civil Eng., 60 Devonshire st., Boston, Mass.	Feb. 3, 1875
BRERETON, THOMAS J.	Supervisor Tyrone Div. Pennsylvania R. R., Osceola, Pa.	Oct. 7, 1885
BROWN, C. NEWTON	Prof. Civil Eng. Ohio State University, 1343 Forsythe ave., Columbus, Ohio.	Nov. 3, 1886
BROWN, WILLIAM CLINTON	86 Liberty st., New York City.	Sept. 1, 1886
BRYAN, KENNERLEY	Ch. Eng. Hale Elevator Co., 187 La Salle st., Chicago, Ill.	March 5, 1890
BURDETT, CHARLES L.	21 Trust Co. Block, Hartford, Conn.	Jan. 6, 1875
BUTTS, EDWARD	City Eng., 608 Exchange Bldg., Kansas City, Mo.	April 6, 1881
BYERS, MORTON L.	Asst. Eng. Main. Way Ind. Div. P. C. C. & St. L. Ry., 191 N. Delaware st., Indianapolis, Ind.	Jan. 2, 1890
CARRERE, J. MAXWELL	Pres. Carrere & Hass Iron Works, Lincoln Bldg., 1 Union Square, New York City.	Oct. 7, 1885
CARTER, SHIRLEY	905½ E. Main st., Richmond, Va.	May 31, 1892
CHADBOURN, W. H., Jr.	U. S. Asst. Eng., Beaufort, N. C.	Dec. 3, 1890
CHIBAS, EDUARDO J.	Eng. Colombian Manganese Mines, Colon, U. S. Colombia.	March 31, 1891
CLARK, WILLIAM G.	(Nickenden & Clark), Gardner Block, Toledo, Ohio.	April 4, 1888
CLARKE, ST. JOHN	(Speidel & Clarke), 196 Van Houten st., Paterson, N. J.	Sept. 5, 1888
CLARKSON, ROBERT C.	(Care Wilson Bros. & Co.), Drexel Bldg., Philadelphia, Pa.	Jan. 5, 1887

Name.	Address.	Date of Membership.	
COLE, GEORGE W.	Fort Riley, Kansas.	Dec.	4, 1889
COMSTOCK, CHARLES W.	Draftsman with Geo. S. Morison, 49 Delaware pl., Chicago, Ill.	April	5, 1892
CORNELL, J. N. HAYWARD	215 West 134th st., New York City.	May	1, 1890
CRANE, WILL E.	37 S. Fitzhugh st., Rochester, N. Y.	May	1, 1889
CREUZBAUR, R. WALTER	Constructing Draftsman, N. Y. C. & H. R. R. R., Room 7, 132 Park ave., New York City.	April	2, 1890
DAVIS, CHANDLER	Dept. of Docks, Pier A, New York City.	Dec.	3, 1890
DAVIS, HENRY L.	Wallingford, Conn.	Nov.	5, 1890
DAVIS, JOSEPH B.	Prof. of Geodesy and Surveying, University of Michigan. 51 S. Ingalls st., Ann Arbor, Mich.	April	1, 1874
DEANS, CHARLES HERBERT	Asst. Eng., SooySmith & Co., 2 Nassau st., New York City.	Dec.	3, 1890
DE LANCEY, EDWARD E.	Leveler Aqueduct Com., Reservoir "M," Purdy's Station, Westchester Co., N. Y.	Feb.	5, 1890
DOWNES, STANCLIFF B.	Civil Eng., 1071 Madison ave., New York City.	April	7, 1886
DURIEA, EDWIN, JR.	Purdy's Station, N. Y.	Feb.	2, 1887
DUSENBURY, WALTER L.	361 Produce Exchange, New York City.	Nov.	5, 1890
EDES, WILLIAM C.	Asst. Eng. Southern Pacific Co., R. R. Bldg., Room 79, San Francisco, Cal.	Sept.	1, 1886
EDWARDS, JAMES H.	Asst. Eng. Estimating Dept., Berlin Iron Bridge Co., East Berlin, Conn.	May	31, 1892
ELLSWORTH, ALFRED B.	(Ellsworth Bros., Civil Engs. and Surveyors), 52 West Eagle st., Buffalo, N. Y.	May	1, 1889
FAIRCHILD, JOHN FLETCHER	Bank Bldg., Mt. Vernon, N. Y.	April	5, 1892
FARGUSSON, MARK	Cons. Eng., Southport, N. C.	Dec.	5, 1888
FARQUHAR, H. S.	Asst. Eng. Balto. City Pass. Ry., 210 E. Lexington st., Baltimore, Md.	April	5, 1892
FARRINGTON, HARVEY	Asst. Eng. N. Y. C. & H. R. R. R., Croton-on-Hudson, N. Y.	June	19, 1891
FENN, WILLIAM HENRY	Berlin Iron Bridge Co., East Berlin, Conn.	May	31, 1892

Name.	Address.	Date of Membership.	
FERGUSON, WILLIAM L.	Asst. Eng. P. R. R., Ebensburg, Pa.	May	1, 1889
FERRER, CARLOS F.	39 Broad st., New York City.	Sept.	2, 1885
FIELD, WILLIAM PIERSON	Civil Eng., Prudential Bldg., New- ark, N. J.	Dec.	7, 1887
FISHER, ELSTNER	Asst. Div. Supt. M. C. R. R., Jack- son, Mich.	April	3, 1889
FOLWELL, A. PRESCOTT	Res. Eng. in chg. Sewer Cons., Hornellsville, N. Y.	Feb.	5, 1890
FOUQUET, LOUIS D.	Asst. Eng. Zig Zag Tunnel N. Y. O. & W. R. R., Middletown, N. Y.	Jan.	7, 1891
FOWLER, C. E.	525 Bryson st., Youngstown, Ohio.	May	7, 1890
FRENCH, JAMES B.	Asst. Eng. C. & O. Ry., Richmond, Va.	Feb.	6, 1889
FUERTE, JAMES H.	Box 117, Camden, Ark.	May	2, 1888
FULLER, WILLIAM B.	Municipal Civil Eng., 59 Mountain ave., Malden, Mass.	June	3, 1885
FURMAN, J. R.	47 West 19th st., New York City.	July	2, 1890
GOLDSMITH, NATHANIEL O.	Eng. The Weir Frog Co., Cincin- nati, Ohio.	June	2, 1886
GOSLING, EDGAR B.	Min. and Civil Eng., in charge of erection Buildings, etc., for Suez Canal Co., Port Tewfik, Egypt.	May	4, 1887
GRAY, WILLIAM	(Care Aqueduct Commrs.), Carmel, N. Y.	May	2, 1888
GRIFFITH, JOHN EDGAR	Res. Eng. Canadian Pacific Ry., Donald, B. C.	April	3, 1889
GUPPY, B. W.	Asst. Eng. Bridge Dept., B. & M. R., Boston, Mass.	June	19, 1891
HAMILTON, MORRISON C.	Div. Eng. N. Y., N. H. & H. R. R., Box 914, New Haven, Conn.	Nov.	6, 1889
HARROLD, THOMAS	Americus, Ga.	Dec.	3, 1891
HARWI, SOLOMON J.	Asst. Ch. Eng.'s office L. V. R. R., Allentown, Pa.	Dec.	4, 1889
HAWES, ARCHIE McL.	Tacoma Light and Water Co., Tacoma, Wash.,	Nov.	2, 1887
HAYNES, G. F.	10 Tremont st., Boston, Mass.	April	6, 1887
HEWITT, CONRAD	90 Nassau st., New York City.	April	5, 1892
HILDRETH, R. W.	Civil Eng., (R. W. Hildreth & Co.), 2 Wall st. (Residence, 25 Madison ave.), New York City.	Jan.	4, 1888
HODGE, HENRY W.	Chief Eng. The Union Iron Works, 29 Broadway, New York City.	Jan.	5, 1887
HOLBROOK, FRANCIS N.	(Address unknown.)	March	2, 1881
HOPPER, JOHN J.	163 West 122d st., New York City.	May	5, 1886

Name.	Address.	Date of Membership.
HORTON, SANDFORD	(Care The Southwestern Co.), St. Charles, Mo.	Feb. 7, 1877
HOWE, HORACE J.	Eng. Main. Way Susq. Div. N. Y., L. E. & W. R. R., Elmira, N. Y.	May 2, 1888
INGALLS, OWEN L.	Asst. Eng. Dist. Govt., 1138 13th st., N. W., Washington, D. C.	March 5, 1890
JENCKES, LAWRENCE B.	Eng. So. Manchester Water Co. and Eng. Manchester Sanitary and Sewerage Co., South Manchester, Conn.	March 31, 1891
JEWETT, CHARLES H.	Civil Eng., Keyport, N. J.	May 31, 1892
JEWETT, WILLIAM B.	17 Summer st., Northampton, Mass.	June 4, 1891
JOHNSTON, STEWART	Supt. The Pittsburgh Steel Casting Co., Pittsburgh, Pa.	March 6, 1889
KELLOGG, NORMAN B.	Div. Roadmaster D. & H. C. Co., Port Henry, N. Y.	Feb. 6, 1878
KELSEY, CLIFFORD S.	Asst. Eng. U. S. Eng.'s Office, 39 Whitehall st., New York City.	April 3, 1889
KHUEN, R., JR.	Bridge Insp. N. Y., L. E. & W. R. R., 21 Cortlandt st., New York City.	Dec. 3, 1891
KIBBE, AUG. S.	620 Union st., Alexandria, Va.	March 6, 1889
KINSEY, FRANK W.	Asst. to S. M. Gray, 10 South st., Newark, N. J.	Feb. 2, 1892
KINSEY, WARREN RUE	10 South st., Newark, N. J.	Oct. 4, 1892
KNOWLES, MORRIS	Asst. Eng. East Jersey Water Co., Montclair, N. J.	Oct. 4, 1892
KOBAYASHI, KAYAJIRO	Eng. Tokyo Water Works, Yocho- machi, Okubo, Tokyo, Japan.	Feb. 1, 1888
KONDO, TORAGORO	Govt. Eng.'s office, Sendai, Japan.	Oct. 3, 1888
LANT, FRANK P.	Civil Eng., 235 West 51st st., New York City.	Oct. 3, 1888
LATHAM, NORMAN S.	Div. Eng. Broadway Cable Cons., 589 11th st., Brooklyn, N. Y.	July 3, 1889
LAWLOR, FRANCIS D. H.	Contractor (Lawlor, Connor & Co.), St. John, N. B., Canada.	Oct. 6, 1886
LAWLOR, THOMAS F.	Res. Eng. E. and W. Approach Poughkeepsie Bridge, Pough- keepsie, N. Y.	June 5, 1889
LAWTON, F. B.	90 Nassau st., New York City.	Nov. 5, 1891

Name.	Address.	Date of Membership.	
LELAND, GEORGE H.	65 Westminster st., Room 27, Providence, R. I.	May	2, 1887
LENTILHON, EUGENE	Transitman Dept. Docks, foot Harrison st., North River, New York City.	March	1, 1891
LORINI, MARIO	Asst. Eng. Dept. Public Works, New York City. (P. O. Box 646, Yonkers, N. Y.)	Sept.	4, 1889
LOWINSON, OSCAR	S. W. cor. 114th st. and Pleasant ave., New York City.	May	3, 1883
LUDWIG, JULIUS ALFRED	Pencoyd Bridge and Cons. Co., Pencoyd, Pa.	May	31, 1892
LYDON, WILLIAM A.	1205 Unity Bldg., 79 Dearborn st., Chicago, Ill.	Jan.	4, 1888
MACKENZIE, WILLIAM B.	Asst. Eng. Intercolonial Ry., Moncton, New Brunswick, Canada.	June	7, 1882
MAGOVERN, EDWARD E.	Cons. Eng., P. O. Box 217, South Orange, N. J.	Jan.	2, 1884
MARTIN, W. B.	Engr. Corps P. R. R., Jersey City, N. J.	May	3, 1892
MCCONNELL, EDWARD T.	Eng. Main. Way, P. & E. Ry., Indianapolis, Ind.	May	5, 1891
MCCORMICK, GEORGE K.	Res. Eng. W. B. & E. R. R., Spring Brook, Pa.	Feb.	6, 1889
MCCULLOH, WALTER	Div. Eng. Sodom Dam Cons., Brewster, N. Y.	July	4, 1888
McFARLAND, BOYNTON W.	Civil Eng., (Care The Solvay Process Co.), Syracuse, N. Y.	Dec.	3, 1891
MCGUIRE, JAMES C.	Eng. U. S. Treas. Dept., Ellicott City, Md.	May	5, 1891
McMEEKIN, CHARLES W.	Ch. Eng. D. M. & N. W. Ry., Des Moines, Iowa.	April	2, 1890
MILLARD, CURTISS	Ch. Eng. Charleston, Sumter & Northern R. R., Sumter, S. C.	April	3, 1889
MILLER, CLIFFORD N.	604 Greenup st., Covington, Ky.	June	4, 1891
MILLER, REUBEN, JR.	Crescent Steel Co., Pittsburgh, Pa.	Oct.	4, 1892
MILLER, RUDOLPH P.	Supervisor R. & D. R. R., Box 355, Richmond, Va.	Jan.	2, 1890
MONTONY, L. G.	With Broadway Cable Road, 113 West 38th st. (Residence, 38 W. 34th st.), New York City.	May	3, 1892
MOSES, JOHN C.	Draftsman, Detroit Bridge and Iron Works, Detroit, Mich.	July	2, 1890
MOSSCROP, ALFRED M.	Asst. Eng. Rochester Bridge and Iron Works, 11 Thayer st., Rochester, N. Y.	May	4, 1887

Name.	Address.	Date of Membership.
MOULTHROP, GEORGE E.	Civil and Min. Eng., Butte, Mont.	Feb. 1, 1888
MYERS, EDMUND T. D., Jr.	Asst. to Pres. Richmond Locomotive and Machine Works, Richmond, Va.	May 2, 1888
NAYLOR, E. B.	Asst. Eng. Park ave., Impvt., 132 Park ave., Room 7, New York City.	Oct. 1, 1890
NEUMEYER, R. E.	Borough Eng., Bethlehem, Pa.	May 31, 1892
NORRIS, ROBERT VAN A.	Asst. Eng. Penn. R. R. Anthracite Coal Cos., P. O. Box 726, Wilkes-Barre, Pa.	Dec. 7, 1887
NYE, ALGERNON S., Jr.	Leveler New Croton Aqueduct, Brewster, N. Y.	July 2, 1890
OESTREICH, HENRY L.	127 East 93d st., New York City.	Oct. 4, 1892
PAINE, GEORGE H.	Gen. Agent U. S. & S. Co., Swiss-vale, Pa.	Nov. 5, 1890
PANI, CAMILO E.	Asst. Eng. Mex. Cent. R. R., Mexico, Mexico.	July 2, 1890
PARISH, WAINWRIGHT	1 West 30th st., New York City.	June 4, 1890
PARKER, CHARLES F.	114 Nassau st., New York City.	March 5, 1890
PENNEY, WILLIAM W.	Pres. Penney Surveying Co., 704 Odd Fellows Bldg., St. Louis, Mo.	April 4, 1888
PERKINS, P. S.	Asst. Eng. N. Y., N. H. & H. R. R., Providence, R. I.	March 5, 1890
PHILLIPS, A. E.	1425 New York ave., Washington, D. C.	Nov. 5, 1891
PHILLIPS, HOWARD CRATHORNE	Asst. Eng. N. Y. & N. Ry., Yonkers, N. Y.	April 5, 1892
PIERSON, STEPHEN C.	Civil Eng., Meriden, Conn.	Nov. 4, 1874
PITNEY, FREDERIC VERNON	Morristown, N. J.	April 5, 1892
POLK, WALTER H.	Topographer, U. S. Eng. office, Vicksburg, Miss.	May 3, 1892
POLLEDO, YSIDORO	Man. Sta. Barbara Sugar Works, Apartado 167, Matanzas, Cuba.	Jan. 2, 1889
PRATT, MASON DELANO	Street Ry. Eng. Penna. Steel Co., Steelton, Pa.	Sept. 5, 1888
PRINCE, JULIUS	75 East 124th st., New York City.	May 3, 1892
PURDY, CORYDON T.	Civil Eng., 1119 The Rookery, Chicago, Ill.	Feb. 2, 1887
PURSLOW, ERNEST J. S.	Civil Eng., Santa Barbara, Cal.	March 5, 1890

Name.	Address.	Date of Membership.
RAASLOFF, HAROLD E. DE	Asst. Eng. Harbor Works, 117 Bluff, Yokohama, Japan.	Dec. 3, 1884
RICKER, GEORGE ALFRED	112 White Bldg., Buffalo, N. Y.	April 7, 1886
RIDGWAY, ROBERT	Asst. Eng. Aqueduct Commission, Purdy's Station, N. Y.	Feb. 1, 1888
RIGGS, CLINTON LEVERING	Vice-Pres. Detrick & Harvey Mach. Co. (Residence, 814 Cathedral st.), Baltimore, Md.	Jan. 7, 1881
ROBINSON, HOLTON DUNCAN	Bridge Draftsman N. Y. C. & H. R. R.R., Grand Central Station, Room 48, New York City.	March 1, 1891
ROEHM, GEORGE E.	Lock Box 594, Wauwatosa, Wis.	June 4, 1889
ROGERS, WALTER A.	Asst. Eng. C. M. & St. P. Ry., Chicago, Ill.	Sept. 10, 1891
ROGGE, JOHN C. L.	Asst. Eng. Com. Street Improvement, 2800 Third ave., New York City.	March 31, 1891
ROHNERT, BENNO	U. S. Eng.'s office, Sault Ste. Marie, Mich.	April 3, 1889
ROSENZWEIG, ALFRED	41 Apartado del Correo, Mexico, Mexico.	June 7, 1882
ROWLAND, CHARLES B.	Continental Iron Works, Greenpoint, N. Y.	May 2, 1888
RUILOBA, J. A.	(Care Alberti Dowling), P. O. Box 302, Havana, Cuba.	Oct. 4, 1892
SANFORD, DAVID C.	Civil Eng., (P. O. Box 1507), New Haven, Conn.	May 6, 1885
SCARBOROUGH, F. W.	Eng. M. of W., C. & O. R. R., Cincinnati, O.	Sept. 3, 1890
SEITZINGER, W. W.	Civil Eng., (P. O. Box 509), 232 N. 6th st., Reading, Pa.	Oct. 2, 1889
SELBY, O. E.	(Care Phoenix Bridge Co.), Phoenixville, Pa.	March 4, 1891
SELL, WILLIAM DRUMM	Box 36, Logan C. H., West Va.	Dec. 3, 1891
SHALER, IRA ALEXANDER	(Washburn, Shaler & Washburn, Civil Engrs. and Contractors), Purdy's Station, N. Y.	July 4, 1888
SHERMAN, CHARLES W.	Instructor Civil Eng., Cornell University, 27 East Buffalo st., Ithaca, N. Y.	Oct. 8, 1891
SHREVE, ARTHUR L.	(With Isaac S. Filbert, Pavement Contr.), 13 E. Franklin st., Baltimore, Md.	Nov. 5, 1890
SIKES, GEORGE RICHARD	Civil Eng., 81 and 82 White Bldg., Buffalo, N. Y.	Sept. 7, 1887
SJÖSTRÖM, IVAR LUDWIG	Northern Pacific R.R., Chehalis, Wash.	Sept. 6, 1892

Name.	Address.	Date of Membership.
SMITH, CHARLES H.	Civil Eng., 15 North st., Middletown, N. Y.	June 4, 1890
SMITH, EUGENE R.	Civil Eng., Islip, Suffolk Co., N. Y.	May 2, 1888
SMITH, MAXWELL	(Care Keep Mfg. Co.), 809 Broadway, New York City.	Sept. 2, 1885
SMITH, MERRITT H.	Civil Eng., Yonkers, N. Y.	June 5, 1889
SMITH, PEMBERTON	Supt. Hudson River Bridge Co. and Supt. Signals Mohawk Div. N. Y.	
	C. & H. R. R. R., Albany, N. Y.	March 31, 1891
SPEIDEL, HUGO S.	(Speidel & Clarke), 196 Van Houten st., Paterson, N. J.	Feb. 5, 1890
SPIELMAN, JOHN G.	Union Bridge Co., Athens, Pa.	March 4, 1891
STAIR, WILLIAM H.	U. S. Engr.'s office, 89 Euclid ave., Cleveland, Ohio.	May 2, 1888
STANFORD, H. R.	Asst. Eng. Bellefontaine Bridge, Alton, Ill.	Oct. 1, 1890
STARR, WILLIAM H.	Supt. Trans. New York, Lake Erie and Western R. R., Jersey City, N. J.	April 2, 1884
STEWART, WILLIAM J.	First Asst. City Surveyor, 16 City Hall, Rochester, N. Y.	May 7, 1890
ST. JOHN, RICHARD C.	(Care Rudolph Hering), 277 Pearl st., New York City.	Oct. 1, 1890
STORROW, SAMUEL	Hydr. Eng., North Yakima, Wash.	Sept. 10, 1891
TALLON, JOHN J.	Asst. Eng., N. H. Co. Ry., 70 7th st., Hoboken, N. J.	Sept. 3, 1890
TAPPAN, ROGER	(Care Am. Soc. C. E.), 127 East 23d st., New York City.	Dec. 3, 1884
TEMPLE, J. FRED.	48 Santa Fé Bldg., Topeka, Kans.	Feb. 5, 1890
TENNEY, GEORGE O.	Eng. and Contractor, Lytle, Ga.	Sept. 7, 1887
THOMAS, SAMUEL R.	Hokendauqua, Pa.	Oct. 4, 1892
THOMPSON, CLARK W.	Orchard pl., La Crosse, Wis.	March 5, 1890
TIBBALS, GEORGE A.	148 Milton st., Brooklyn, N. Y.	May 2, 1888
TIBBALS, SAMUEL G.	148 Milton st., Brooklyn, N. Y.	May 2, 1888
TITUS, WALTON O.	Apartado 320, Mexico, Mexico.	April 7, 1886
TREADWELL, LEE	Prin. Asst. Eng. to J. A. L. Wad-dell, Keith & Perry Bldg., Kansas City, Mo.	Nov. 5, 1890
TRIEST, WOLFGANG G.	Prin. Asst. to A. P. Boller, 71 Broadway, New York City.	Sept. 3, 1890
TROTTER, ALFRED W.	Civil Eng., 146 Broadway. (Residence, 112 East 127th st.), New York City.	Sept. 5, 1883
TROWBRIDGE, FRANCIS C.	Asst. Secy. The Black & Clawson Co., P.O. Box 383, Hamilton, Ohio.	Dec. 4, 1889
TSUJI, TARO	24 Hongo Umicho Nichome, Tokyo, Japan.	Oct. 8, 1891

Name.	Address.	Date of Membership.
TUCKER, WILLIAM C.	109 East 16th st., New York City.	May 5, 1891
TUMBRIDGE, J. W.	Hotel St. George, Brooklyn, N. Y.	March 1, 1892
TUTHILL, GABRIEL C.	Asst. Bridge Eng., M. C. R. R., Detroit, Mich.	May 31, 1892
TUTHILL, JOB	Eng. Bridges, C. & W. M. Ry. and D. L. & N. R. R., Grand Rapids, Mich.	June 6, 1888
TUTTLE, ARTHUR S.	Asst. Eng. Dept. City Works, Municipal Bldg., Brooklyn, N. Y.	March 2, 1887
TYRRELL, HENRY G.	Pottsville, Pa.	Feb. 5, 1890
USINA, D. A.	Engr. Corps, New Water Works, 78 Bolton st., Savannah, Ga.	March 1, 1892
VAN CLEVE, A. HOWELL	Cataract Cons. Co., 48 5th st., Niagara Falls, N. Y.	May 31, 1892
VAN ZILE, HARRY L.	55 North Pearl st., Albany, N. Y.	Jan. 6, 1886
VAUGHAN, GEORGE W.	Div. Eng. Eastern Div. New York, Chicago & St. Louis R. R., Broadway Depot, Cleveland, Ohio.	March 3, 1886
VAUX, DOWNING	Bible House, Astor pl., New York City.	Nov. 2, 1887
VIER, HENRY	Asst. Eng. N. Y. C. & H. R. R. R., Rochester, N. Y.	Dec. 4, 1889
VILLALON, JOSÉ R.	Res. Eng. Ponupo Manganese & R. R. Co., Santiago, Cuba.	July 4, 1888
WADA, YOSHICHIKA	Ch. Eng. Tiku-Ho Ry., Nogata Kurate-gun, Fukuoka-Ker, Japan.	Sept. 7, 1887
WADDELL, MONTGOMERY	The Waddell-Entz Electric Co., Bridgeport, Conn.	Sept. 1, 1886
WARNER, CHARLES S.	132 Broadway, New York City.	Jan. 2, 1889
WATSON, THOMAS T.	Commercial Club, Tacoma, Wash.	Feb. 5, 1890
WHEATLEY, ARTHUR C.	Asst. Eng. Transvaal & Atlantic Ry., Southwest Africa. Address: (Care George Hume, Ltd.), 58 Finsbury Pavement, London, England.	May 7, 1890
WILKINS, GEORGE S.	Princeton, N. J.	Oct. 4, 1892
WILLIAMS, WILLIAM P.	(Address unknown.)	May 4, 1887
WILSON, CHARLES W. S.	Frog and Switch Dept. Penna. Steel Co., Steelton, Pa.	April 5, 1892
WILSON, FRANK W.	Bridge Dept. N. Y. C. & H. R. R. R., Room 42, Grand Central Station, New York City.	May 5, 1891
WING, FREDERICK K.	(Ricker & Wing, Civil & Landscape Engrs.), 111 and 112 White Bldg., Buffalo, N. Y.	May 31, 1892

Name.	Address.	Date of Membership.
WOOD, CHARLES FRANCIS	Eng. and Supt. Knoxville Water Co., Knoxville, Tenn.	Dec. 5, 1888
WOOD, IRVING S.	Asst. Eng. Water Dept., City Eng. office, Providence, R. I.	March 5, 1890
YATES, PRESTON K.	Gen. Insp. 155th st. Viaduct, 236 West 55th st., New York City.	June 6, 1883
YEREANCE, WILLIAM B.	Brooklyn Elev. R. R., 31 Sands st., Brooklyn, N. Y.	May 3, 1892
YEATMAN, HENRY C.	Asst. Eng. Sierra Mojada Branch M. I. R.R., Box 109, Eagle Pass, Texas.	May 7, 1890
YORK, H. W.	Ch. Eng. United Electric Light & Power Co., Room 5, Times Bldg., New York City.	May 2, 1888
YOUNG, HERBERT A.	Secy. to Asst. Man. Mexican Central Ry., Mexico, Mexico.	May 7, 1884
ZABRISKIE, AARON J.	104 Sherman ave., Newark, N. J.	July 1, 1885
ZELLER, ALBERT H.	Asst. Eng. Edge Moor Bridge Works, Wilmington, Del.	May 7, 1890

JUNIORS, 236.

FELLOWS.

[F. Am. Soc. C. E.]

Name.	Address.	Date of Membership.
ADAMS, EDWARD DEAN	Pres. Cataract Cons. Co., Mills Bldg., New York City.	March 31, 1891
AINSLIE, JAMES W.	Louisville, Ky.	May 28, 1872
ALBRIGHT, JOHN J.	Buffalo, N. Y.	April 20, 1886
BARBER, AMZI LORENZO	Chairman Board of Directors Barber Asphalt Paving Co., 1 Broadway New York City.	March 19, 1886
BATTERSON, J. G.	Pres. Travelers' Insurance Co., Hartford, Conn.	June 7, 1876
BELKNAP, WILLIAM R.	115 West Main st., Louisville, Ky.	May 28, 1872
BLATCHFORD, E. W.	375 La Salle ave., Chicago, Ill.	Feb. 6, 1873
BOUTON, NATHANIEL S.	Kenwood Bridge Co., 614 First Natl. Bank Bldg., Chicago, Ill.	Dec. 30, 1872
BRIDGFORD, JOHN	Albany, N. Y.	Jan. 14, 1871

Name.	Address.	Date of Membership.
CHANUTE, OCTAVE	(<i>Past-President.</i>) Cons. Eng., } M. 413 E. Huron st., Chicago, Ill. } F.	Feb. 19, 1868 July 11, 1872
CHENEY, NATHANIEL	(Cheney & Hewlett), Iron Works, 100 Rodney st., Brooklyn, N. Y.	June 21, 1870
CLARK, EDWARD W.	139 South 4th st., Philadelphia, Pa.	April 8, 1870
CLARKE, THOMAS C.	44 Broadway, New York City. } M. } F.	March 18, 1868 May 20, 1872
CLEMENT, VICTOR M.	Gen. Man. Bunker Hill & Sullivan M. & C. Co., Wardner, Idaho.	Jan. 8, 1890
COIT, EDWARD W.	Local Man. National Tube Works, St. Louis, Mo.	Sept. 20, 1872
COLBY, CHARLES L.	Pres. St. Paul & Northern Pacific R. R., 3 East 69th st., New York City.	July 31, 1883
COLEMAN, T. C.	252 W. Main st., Louisville, Ky.	May 28, 1872
CONRO, ALBERT	Milwaukee, Wis.	June 13, 1883
COOPER, EDWARD	17 Burling Slip, New York City.	Dec. 10, 1885
DARWIN, HARRY G.	Asst. Eng. Safety Car Heating and Lighting Co., 160 Broadway, Room 18, New York City.	March 22, 1887
DE GARAY, FRANCISCO	Prof. National School of Engineers, Mexico, Mexico.	Aug. 31, 1883
DIVEN, ALEXANDER S.	Elmira, N. Y.	June 16, 1870
DU PONT, BIDERMAN	Louisville, Ky.	Sept. 5, 1873
FARREN, B. N.	Montague City, Mass.	March 12, 1870
FINK, ALBERT	(<i>Past-President.</i>) Louisville, } M. Ky. } F.	July 20, 1870 Sept. 3, 1872
FLINT, CHARLES R.	Consul Gen. Costa Rica, cor. Broad and Beaver sts. (Residence, 4 East 36th st.), New York City.	June 7, 1876
GILMAN, CHARLES C.	Eldora, Iowa.	May 11, 1871
GREEN, SAMUEL M.	R. R. Contractor, 81 New Insur- ance Bldg., Milwaukee, Wis.	Sept. 5, 1888
GURNEE, WALTER S.	7 Nassau st., New York City.	May 10, 1870
HARRISON, STEPHEN A.	81 New Insurance Bldg., Milwan- kee, Wis.	Jan. 30, 1873
HILL, JAMES J.	Pres. Great Northern Ry., St. Paul, Minn	Jan. 10, 1889
HOLMAN, STEPHEN	Treas. Holyoke Machine Co., Wor- cester, Mass.	July 11, 1872
HOWLAND, GEORGE, Jr.	New Bedford, Mass.	June 6, 1870
HUNTINGTON, COLLIS P.	Pres. Central Pacific R. R., 23 Broad st., New York City.	March 10, 1877

Name.	Address.	Date of Membership.
JONES, BENJAMIN F.	Pittsburgh, Pa.	June 15, 1870
JOY, JAMES F.	Detroit, Mich.	Nov. 6, 1872
LONG, DENNIS	Louisville, Ky.	March 28, 1872
MERRITT, GEORGE	131 William st., New York City.	May 6, 1870
MEYER, HENRY C.	Editor and Proprietor <i>The Engineering Record</i> , 277 Pearl st., New York City.	Oct. 22, 1885
NORMAN, GEORGE H.	Newport, R. I.	{ M. Feb. 19, 1869 F. March 23, 1870
PROSSER, THOMAS	15 Gold st., New York City.	June 1, 1870
REED, WILLIAM W.	Pres. Erie City Pass. Ry., 17 East 10th st., Erie, Pa.	Dec. 20, 1872
RICHMOND, HENRY A.	Buffalo, N. Y.	July 7, 1870
RUMSEY, B. C.	Buffalo, N. Y.	May 12, 1870
SWIFT, McREE	New Brunswick, N. J.	March 9, 1870
TASKER, STEPHEN P. M.	Mech. Eng., 1328 South 5th st., Philadelphia, Pa.	Sept. 20, 1872
TAYLOR, WILLIAM J.	Gen. Man. Taylor Iron and Steel Co., High Bridge, N. J.	May 10, 1870
TOUCEY, JOHN M.	Gen. Man. New York Central & Hudson River R. R., Grand Central Station, New York.	May 17, 1870
WALKER, GEORGE C.	228 Michigan ave., Chicago, Ill.	Feb. 6, 1873
WATSON, JAMES	Paterson, N. J.	Dec. 5, 1872
WELTON, NELSON J.	Civil Engineer, Waterbury, Conn.	Jan. 20, 1873

FELLOWS, 51.

RECAPITULATION, OCTOBER 31, 1892.

Honorary Members	8
Corresponding Members	3
Members	1,131
Associate Members	106
Associates	70
Juniors	236
Fellows (not Members) ..	47
Subscribers to the Building Fund not otherwise connected with the Society	35
Total	1,636

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ABBOT, FREDERICK WILLIAM.....	Assoc. M.	ARMINGTON, JAMES H.....	M.
ABBOTT, JOB.....	M.	ARTINGSTALL, SAMUEL G.....	M.
ABBOTT, WILLIAM L.....	Assoc.	ASHMEAD, FRANK M.....	M.
ABERT, S. THAYER.....	M.	ASPINWALL, THOMAS.....	M.
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ADAMS, JULIUS W.....	Hob. M.	ATWATER, A. B.....	M.
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ALDEN, JOHN F.....	M.		
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ALLEN, C. FRANK.....	M.	BACOT, WILLIAM SINCLAIR.....	M.
ALLEN, CALVIN H.....	M.	BAIER, JULIUS.....	Assoc. M.
ALLEN, HENRY C.....	Assoc. M.	BAILEY, GEORGE I.....	M.
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ALLEN, KENNETH.....	M.	BAKER, HOLLAND W.....	M.
ALLEN, THOMAS W.....	Jun.	BAKER, WILLIAM H.....	M.
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AMWEG, FREDERICK J.....	M.	BALDWIN, WARD.....	M.
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BAYLISS, RAWLINSON T.....	M.	BOEKE, AUGUSTUS W.....	M.
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BECKWITH, LEONARD F.....	M.	BOLLER, ALFRED P.....	M.
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BELKNAP, WILLIAM R.....	F.	BONNETT, CHARLES P.....	Jun.
BELL, ANDREW.....	M.	BONNETT, L. B.....	Jun.
BELL, GILBERT J.....	Jun.	BONNETT, WILLIAM W.....	M.
BELL, HENRY P.....	M.	BONTECOU, DANIEL.....	M.
BEMENT, ROBERT B. C.....	M.	BONZANO, ADOLPHUS.....	M.
BENSEL, JOHN A.....	M.	BONZANO, MAXIMILIAN F.....	M.
BENSON, FRED. S.....	M.	BOOKER, B. F.....	M.
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BERG, LOUIS DE COPPET.....	M.	BOWDITCH, ERNEST W.....	Jun.
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BETTES, CHARLES R.....	Jun.	BOUSCAREN, LOUIS F. G.....	M.
BEUGLER, EDWIN J.....	Jun.	BOWIE, AUGUSTUS J.....	M.
BIDDLE, WILLIAM F.....	M.	BOYD, CHARLES R.....	M.
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BISHOP, THOMAS S.....	M.	BRADBURY, HENRY R.....	Assoc.
BISSELL, F. E.....	M.	BRADLEY, O. W.....	Assoc.
BISSELL, H.....	M.	BRADLEY, TIMOTHY C.....	M.
BIXBY, WILLIAM H.....	M.	BRADLEY, WILLIAM H.....	M.
BLACK, WM. MURRAY.....	M.	BRAINARD, HENRY A.....	M.
BLACKFORD, FRANCIS W.....	M.	BRECKENRIDGE, CABELL.....	M.
BLACKWELL, CHARLES.....	M.	BREEN, HOWARD.....	M.
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BRENDLINGER, PETER F. M.	BYERS, MORTON L. Jun.
BRERETON, THOMAS J. Jun.	BYLLESBY, HENRY M. M.
BREUCHAUD, JULES. Assoc.	
BRIDGFORD, JOHN F.	CAIN, WILLIAM. M.
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BRIGGS, ROSWELL E. M.	CAMP, FRED. A. M.
BRINCKERHOFF, ALEX. G. M.	CAMPBELL, ALLAN. Hon. M.
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BROWN, JACOB B. Assoc.	CARRERE, J. MAXWELL. Jun.
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BUCK, LEFFERT L. M.	CHANUTE, OCTAVE. M.
BUCK, WALDO E. M.	CHAPIN, LOOMIS E. Assoc. M.
BUDDE, OTTO. M.	CHENEY, JOHN E. M.
BUDGE, ENRIQUE. M.	CHENEY, NATHANIEL. F.
BULLOCK, WILLIAM D. M.	CHIBAS, EDUARDO J. Jun.
BURBANK, GEORGE B. M.	CHILDS, JAMES E. M.
BURDEN, JAMES A. M.	CHIPMAN, WILLIS. M.
BURDETT, CHARLES L. Jun.	CHITTENDEN, SAMUEL H. M.
BURGWYN, COLLINSON P. E. M.	CHRISTIE, JAMES. M.
BURNET, GEORGE. M.	CHURCH, BENJAMIN S. M.
BURNHAM, GEORGE, Jr. Assoc.	CHURCH, CHARLES T. M.
BURNS, EDWARD C. M.	CHURCH, GEORGE EARL. M.
BURPEE, MOSES. M.	CHURCHILL, CHARLES S. M.
BURR, EDWARD. M.	CISNEROS, FRANCIS J. M.
BURR, WILLIAM H. M.	CLAPP, G. H. Assoc. M.
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BURROWES, FRANCIS S. M.	CLARK, GEO. HUNTINGTON. M.
BUSH, H. D. M.	CLARK, EDWARD W. F.
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BUTTS, EDWARD. Jun.	CLARK, LUDLOW V., Jr. Assoc.
BUTTERFIELD, FRANCIS E. M.	CLARK, WILLIAM G. Jun.
BUXTON, CLIFFORD. M.	CLARKE, DAVID D. M.

CLARKE, ELIOT C.....M.	CRAFTS, GEORGE H..... Assoc.
CLARKE, ST. JOHN.....Jun.	CRAIG, CHAMBERS M.....M.
CLARKE, THOMAS C.....M.	CRAIGHILL, WILLIAM P.....M.
CLARKSON, ROBERT C.....Jun.	CRANDALL, CHARLES L.....M.
CLEEMANN, THOMAS M.....M.	CRANE, WILL E.....Jun.
CLEMENT, FRANK H.....M.	CRAVEN, ALFRED.....M.
CLEMENT, VICTOR M.....F.	CRAWFORD, WILLIAM.....M.
COBB, ROBERT L.....M.	CREUZBAUR, R. WALTER.....Jun.
COCHRAN, A. P.....F.	CROES, J. JAMES R.....M.
COCKROFT, C. A.....Assoc. M.	CROSBY, BENJAMIN L.....M.
CODWISE, EDWARD B.....M.	CROSBY, HORACE.....M.
COE, WILLIAM W.....M.	CROSBY, WILSON.....M.
COFFIN, AMORY.....M.	CROWELL, FOSTER.....M.
COFFIN, WILLIAM B.....M.	CULYER, JOHN Y.....M.
COGSWELL, WILLIAM B.....M.	CUMMINGS, R. A..... Assoc. M.
COHEN, MENDES.....M.	CUNNINGHAM, A. C.....Assoc. M.
COIT, EDWARD W.....F.	CUNNINGHAM, DAVID W.....M.
COLBY, CHARLES L.....F.	CUNNINGHAM, JAMES H.....M.
COLE, GEORGE W.....Jun.	CURRIE, DANIEL McN.....M.
COLE, H. J.....Assoc. M.	CURTIS, FAYETTE S.....M.
COLEMAN, T. C.....F.	CURTIS, WENDELL R.....M.
COLLINGWOOD, FRANCIS.....M.	CURTIS, WALTER W.....M.
COLTON, OREN B.....M.	CURTIS, W. G.....M.
COMER, H.....Assoc.	CUSHING, WILLIAM C.....Assoc. M.
COMFORT, SILAS G.....Assoc.	CUTSHAW, W. E.....M.
COMPTON, ALFRED G.....Assoc.	
COMSTOCK, CHARLES W.....Jun.	DAGRON, JAMES G.....M.
COMSTOCK, CYRUS B.....M.	DANFORTH, FRED.....M.
CONNETT, ALBERT N.....M.	DARLINGTON, FRANK G.....M.
CONNOR, E. H.....Assoc. M.	DARRACH, CHARLES G.....M.
CONOVER, ALLAN D.....Assoc. M.	DARWIN, HARRY G.....F.
CONRO, ALBERT.....F.	DAVIS, CHANDLER.....Jun.
COOPER, EDWARD.....F.	DAVIS, CHARLES.....M.
CONSTABLE, CASIMIR.....M.	DAVIS, CHARLES E. L. B.....M.
CONVERSE, W. H.....Assoc. M.	DAVIS, CHESTER B.....M.
COOLEY, GEORGE W.....M.	DAVIS, FRANK P.....M.
COOLMAN, DEWITT C.....M.	DAVIS, HENRY L.....Jun.
COOPER, SAMUEL L.....M.	DAVIS, JOSEPH B.....Jun.
COOPER, THEODORE.....M.	DAVIS, JOSEPH P.....M.
COPPÉE, H. ST. L.....M.	DAVIS, J. WOODBRIDGE.....Assoc.
CORNELL, GEORGE B.....M.	DEANS, CHARLES HERBERT.....Jun.
CORNELL, J. N. HAYWARD.....Jun.	DAVIS, ROB B.....M.
CORTHELL, ELMER L.....M.	DAVISON, GEORGE S.....M.
COTTON, JOSEPH P.....M.	DAWLEY, EDWIN P.....M.
COURTENAY, WILLIAM H.....M.	DEANS, JOHN STERLING.....M.
COVODE, JAMES H.....M.	DECOURCEY, BOLTON W.....M.
COWLES, WALTER L.....M.	DEEN, J. W.....M.
COX, A. BECKMAN.....M.	DEFREES, MORRIS M.....M.
COXE, ECKLEY B.....M.	DEFUNIAK, FREDERICK.....M.

DE GARAY, FRANCISCO.....F.	ECKART, WILLIAM R.....M.
DELAFIELD, CLARENCE.....M.	ECKERT, EDWARD W.....M.
DE LANCEY, EDWARD E.....Jun.	EDES, WILLIAM C.....Jun.
DEMPSTER, ALEXANDER.....M.	EDWARDS, HARRY W.....M.
DENNIS, WILLIAM F.....M.	EDWARDS, J. H.....Jun.
DENTON, JAMES E.....M.	EDWARDS, NATHANIEL M.....M.
DERRICK, HENRY C.....M.	EGGLESTON, T. C.....M.
DEVIN, GEORGE.....M.	EGLESTON, THOMAS.....M.
DEYO, S. L. F.....M.	ELDRIDGE, G. M.....Assoc. M.
DICKINSON, POMEROY P.....M.	ELLIOT, CHARLES D.....M.
DIDIER, PAUL.....M.	ELLIOTT, CHAS. GLEASON.....M.
DILLMAN, GEORGE L.....M.	ELLIOTT, JNO. S.....Assoc. M.
D'INVILLIERS, CAMILE S.....M.	ELLIS, S. CLARENCE.....M.
DIVEN, ALEXANDER S.....F.	ELLSWORTH, ALFRED B.....Jun.
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DUANE, JAMES.....M.	EWING, W. B.....Assoc. M.
DU BARRY, EDMUND L.....Assoc.	
DU BARRY, JOSEPH N.....M.	FAIRCHILD, J. F.....Jun.
DUBOIS, A. JAY.....M.	FAIRLEIGH, JAS. A.....M.
DUDLEY, C. B.....M.	FANNING, JOHN T.....M.
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DUNN, D. B.....M.	FARQUHAR, H. S.....Jun.
DUNN, E. C.....Assoc. M.	FARREN, B. N.....F.
DUNN, JAMES R.....Assoc.	FARRINGTON, HARVEY.....Jun.
DU PONT, BIDERMAN.....F.	FAVA, FRANCIS R., JR.....M.
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DUSENBURY, WALTER L.....Jun.	FELTON, SAMUEL M.....M.
	FENN, WILLIAM HENRY.....Jun.
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EARLEY, JOHN E.....M.	FERGUSON, WILLIAM L.....Jun.
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EATON, FREDERICK.....M.	FERRY, CHARLES A.....M.
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FIELDS, SAMUEL J.....	M.	FROST, GEORGE HENRY.....	Assoc.
FIESER, L. F.....	M.	FTELEY, ALPHONSE.....	M.
FILLEY, HIEL H.....	M.	FUERTES, ESTEVAN A.....	M.
FINK, ALBERT.....	M.	FUERTES, JAMES H.....	Jun.
FINK, RUDOLPH.....	M.	FULTON, JOHN A.....	M.
FINNEY, FREDERICK N.....	M.	FULLER, EUGENE F.....	M.
FIRMSTONE, FRANK.....	M.	FULLER, FRANKLIN I.....	M.
FISHER, CLARK.....	M.	FULLER, FRANK L.....	M.
FISHER, EDWIN A.....	M.	FULLER, WILLIAM B.....	Jun.
FISHER, ELSTNER.....	Jun.	FURMAN, J. R.....	Jun.
FISHER, FRANCIS DAVIS.....	M.	FUTAMI, KIOSABURO.....	Assoc.
FISHER, JANON.....	Assoc. M.		
FISK, WILBUR C.....	Assoc.	GAHAGAN, WALTER H.....	Assoc. M.
FITCH, ASA B.....	M.	GAMBLE, FRANCIS C.....	M.
FITZGERALD, DESMOND.....	M.	GARDINER, EDMUND L. B.....	M.
FITZGERALD, J. LELAND.....	M.	GARDNER, G. CLINTON.....	M.
FITZHUGH, G. D.....	M.	GARDNER, MARTIN L.....	Assoc. M.
FLAD, EDWARD.....	M.	GATCHELL, GEORGE S.....	M.
FLAD, HENRY.....	M.	GATES, CHRISTOPHER L.....	M.
FLAGG, J. FOSTER.....	M.	GATES, HORACE D.....	M.
FLEMING, SANDFORD.....	M.	GAY, CHARLES W.....	M.
FLETCHER, ROBERT.....	Assoc.	GAY, MARTIN.....	M.
FLINT, CHARLES R.....	F.	GAYLER, CARL.....	M.
FLYNN, PATRICK J.....	M.	GAYOL, ROBERTO.....	M.
FOCHT, LOUIS.....	Assoc. M.	GEDDES, JAMES K.....	M.
FOLWELL, A. P.....	Jun.	GELETTE, WILLIAM D.....	M.
FOOTE, ARTHUR DE W.....	M.	GERBER, EMIL.....	M.
FORCE, CYRUS G.....	M.	GERMANN, FRANZ.....	M.
FORD, PORTER D.....	M.	GIAVER, J. G.....	M.
FORNEY, MATTHIAS N.....	M.	GIBBS, CHARLES W.....	M.
FORSYTH, ROBERT.....	M.	GIBSON, WILLIAM, Jr.....	Assoc.
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FOUQUET, JOHN DOUGLAS.....	M.	GIFFORD, GEO. E.....	Assoc. M.
FOUQUET, LOUIS D.....	Jun.	GILBERT, CHARLES PHELPS.....	M.
FWLER, C. E.....	Jun.	GILES, ROBERT.....	M.
FOX, SIR DOUGLAS.....	Cor. M.	GILLETTE, EDWARD, Jr.....	M.
FOX, S. WATERS.....	M.	GILLHAM, ROBERT.....	M.
FRANCIS, CHARLES.....	M.	GILMAN, CHARLES C.....	F.
FRANCIS, GEORGE B.....	M.	GLADDING, HENRY H.....	M.
FRANCIS, HENRY N.....	M.	GLEIM, CHARLES OTTO.....	Cor. M.
FRANKLIN, WILLIAM B.....	M.	GLOVER, OLIVER L.....	M.
FRAZIER, HARRY.....	M.	GOD, CHARLES E.....	M.
FRAZIER, JAMES L.....	M.	GODDARD, L. W.....	Assoc. M.
FREASE, HARRY.....	Assoc. M.	GOING, ALVAH S.....	Assoc. M.
FREEMAN, JOHN R.....	M.	GOLAY, PHILIP.....	M.
FRENCH, JAMES B.....	Jun.	GOLDMARK, HENRY.....	M.
FREYHOLD, FELIX.....	Assoc. M.	GOLDSMITH, NATHANIEL O.....	Jun.

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GOODMAN, EDWARD H.	Assoc.	HAMBLETON, FRANCIS H.	M.
GOODRICH, WILBUR F.	M.	HAMILTON, MORRISON C.	Jun.
GOODWIN, H. STANLEY.	M.	HAMILTON, WILLIAM G.	M.
GOSLING, EDGAR B.	Jun.	HAMMOND, HENRY B.	Assoc.
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GOWEN, CHARLES SEWALL.	M.	HARDING, HENRY.	M.
GRAHAM, CHARLES H.	M.	HARDWICKE, ALAN H. G.	Assoc.
GRANT, EMERSON W.	M.	HARDY, GEORGE R.	M.
GRANT, J. H.	M.	HARDY, HARRY.	Assoc. M.
GRANT, THOMAS H.	Assoc. M.	HARING, JAMES SMITH.	M.
GRANT, WILLIAM H.	M.	HARISON, R. MORLEY.	M.
GRAY, GEORGE E.	M.	HARLOW, JAMES H.	M.
GRAY, SAMUEL M.	M.	HARLOWE, CHARLES.	M.
GRAY, WILLIAM.	Jun.	HARRIS, CHARLES M.	Assoc.
GREEN, BERNARD R.	M.	HARRIS, ROBERT L.	M.
GREEN, SAMUEL M.	F.	HARRIS, WILLIAM P.	M.
GREENE, BENJAMIN D.	M.	HARRISON, EDLOW W.	M.
GREENE, CHARLES E.	M.	HARRISON, STEPHEN A.	F.
GREENE, DAVID M.	M.	HARROD, BENJAMIN M.	M.
GREENE, EDWARD A.	M.	HARROLD, THOS.	Jun.
GREENE, FRANCIS VINTON.	M.	HARWI, SOLOMON J.	Jun.
GREENE, GEORGE S.	Hon. M.	HASEROUCK, CHARLES A.	Assoc. M.
GREENE, GEORGE S., JR.	M.	HASELL, BENTLEY D.	M.
GREENE, JOSEPH N.	M.	HASKELL, C. F. B.	M.
GREENOUGH, MALCOLM S.	M.	HASKINS, WILLIAM J.	M.
GREINER, JOHN E.	M.	HASWELL, CHAS. HAYNES.	M.
GRIFFIN, P. H.	Assoc.	HATCH, F. T.	M.
GRIFFITH, JOHN EDGAR.	Jun.	HAUPT, LEWIS M.	M.
GRIMM, CARL R.	M.	HAVEN, WILLIAM A.	M.
GRIMSHAW, J. WALTER.	M.	HAVILAND, ARTHUR.	M.
GRISWOLD, FRANK L.	M.	HAWLEY, WM. CHAUNCEY.	Assoc. M.
GUNNELL, WILLIAM C.	M.	HAWKS, ARCHIE McL.	Jun.
GUPPY, B. W.	Jun.	HAWKS, JAMES D.	M.
GURNEE, WALTER S.	F.	HAYES, EDMUND.	M.
GUTHRIE, EDWARD B.	M.	HAYES, R. SOMERS.	M.
GZOWSKI, SIR CASIMIR S.	M.	HAYNES, G. F.	Jun.
		HAZELTON, CHARLES W.	M.
HAGUE, CHAS. A.	M.	HAZEN, JOHN V.	Assoc.
HAIGHT, STEPHEN S.	M.	HAZLEHURST, GEORGE B.	M.
HAINES, CASPAR W.	M.	HEALD, SIMPSON C.	M.
HAINES, HENRY S.	M.	HEALY, JOHN F.	Assoc. M.
HAINS, PETER C.	M.	HEGEMAN, WILLIAM W.	M.
HALE, RICHARD A.	M.	HEMMING, D. W.	Assoc. M.
HALL, JULIEN A.	M.	HENDERSON, JOHN B.	M.
HALL, CLAYTON C.	Assoc.	HENDRIE, JOHN S.	Assoc.

HENNING, CHARLES S.....M.	HOWARD, FREDERICK B.....M.
HENNY, DAVID C.....M.	HOWE, EDWARD W.....M.
HENRY, D. FARRAND.....M.	HOWE, HORACE J.....Jun.
HENTHORN, JOHN T.....M.	HOWE, MALVERD A.....Assoc.
HERBERT, ARTHUR P.....M.	HOWE, MILTON G.....M.
HERING, RUDOLPH.....M.	HOWELL, GEORGE W.....M.
HERMANN, EDWARD A.....M.	HOWLAND, ARTHUR H.....M.
HERMANY, CHARLES.....M.	HOWLAND, GEORGE, JR.....F.
HERRICK, HENRY A.....M.	HOXIE, R. L.....M.
HERSCHEL, CLEMENS.....M.	HOYT, WILLIAM E.....M.
HEUER, WILLIAM H.....M.	HUDSON, JOHN R.....M.
HEWITT, CHARLES E.....M.	HUGHES, WILLIAM M.....M.
HEWITT, CONRAD.....Jun.	HUMPHREYS, DAVID C.....M.
HIDE, ARTHUR.....M.	HUMPHREY, W. S.....Assoc. M.
HILBERT, HELIODORE J.....M.	HUNSIKER, MILLARD.....Assoc.
HILDRETH, R. W.....Jun.	HUNT, ALFRED E.....M.
HILGARD, K. EMIL.....M.	HUNT, CHARLES WARREN.....M.
HILL, ALBERT B.....M.	HUNT, CONWAY B.....M.
HILL, JAMES J.....F.	HUNT, RANDELL.....M.
HILL, JOHN E.....Assoc. M.	HUNT, ROBERT W.....M.
HILL, JOHN W.....M.	HUNTINGTON, COLLIS P.....F.
HILL, WARREN E.....M.	HUSON, HERBERT S.....M.
HILL, W. R.....M.	HUTCHINSON, GEORGE HUNT..Assoc. M.
HILLMAN, CHARLES F.....M.	HUTTON, WM. RICH.....M.
HILLS, FRANCIS L.....M.	
HILTON, GEORGE PORTER.....M.	INGALLS, OWEN L.....Jun.
HINCKLEY, HOWARD V.....M.	IVES, CHAUNCEY.....M.
HINCKLEY, JOHN F.....M.	
HOAG, SIDNEY W., Jr.....M.	JACKMAN, HOWARD H.....M.
HOESON, JOSEPH.....M.	JACKSON, J. M.....M.
HODGDON, FRANK W.....M.	JACKSON, LEWIS B.....M.
HODGE, HENRY W.....Jun.	JACKSON, THOMAS M.....M.
HODGES, ARTHUR.....M.	JACKSON, WILLIAM.....M.
HODGES, GILBERT.....M.	JACOBY, HENRY S.....Assoc.
HOFF, OLAF.....M.	JAMESON, CHARLES D.....M.
HOLBROOK, FRANCIS N.....Jun.	JAMIESON, J. Q.....M.
HOLBROOK, FRED'K W. D.....M.	JANNEY, WILLIAM D.....Assoc. M.
HOLBROOK, HENRY R.....M.	JAQUES, W. H.....M.
HOLMAN, M. L.....M.	JARDINE, A. WILLIAM.....M.
HOLMAN, STEPHEN.....F.	JARVIS, CHARLES M.....M.
HOLT, HERBERT S.....M.	JAYCOX, THOMAS W.....M.
HOOPER, JOSEPH W.....M.	JENCKES, LAWRENCE B.....Jun.
HOPKINS, CHAS. COMSTOCK.....M.	JENKINS, WILLIAM DUNBAR.....M.
HOPPER, JOHN J.....Jun.	JENNINGS, HENRY C.....M.
HORTON, HORACE E.....M.	JENNINGS, W. H.....M.
HORTON, SANDFORD.....Jun.	JENNINGS, WILLIAM T.....M.
HOUSE, BRUCE F.....M.	JEWETT, C. H.....Jun.
HOUSTON, JOHN.....M.	JEWETT, WILLIAM B.....Jun.
HOUSTON, JOHN. J. L.....Assoc. M.	JEWETT, WILLIAM C.....M.

JOHNSON, CHARLES R.....M.	KINDER, CLAUDE WILLIAM.....M.
JOHNSON, JAMES M.....M.	KING, C. C.....M.
JOHNSON, JOHN B.....M.	KING, FRANK P.....M.
JOHNSON, LORENZO M.....M.	KING, HARRY W.....Assoc.
JOHNSON, PHELPS.....M.	KING, PAUL S.....M.
JOHNSON, THOMAS H.....M.	KINGMAN, LEWIS.....M.
JOHNSTON, A. LANGSTAFF.....M.	KINGSLEY, MARVIN W.....M.
JOHNSTON, HORACE G.....M.	KINNEY, EDWARD C.....M.
JOHNSTON, J. HOWARD.....M.	KINSEY, FRANK W.....Jun.
JOHNSTON, STEWART.....Jun.	KINSEY, WARREN RUE.....Jun.
JONES, BENJAMIN F.....F.	KINSLEY, THOMAS P.....M.
JONES, WASHINGTON.....M.	KIRKPATRICK, WALTER G....Assoc. M.
JORDAN, EDWARD C.....M.	KIRTLAND, ALFRED P.....M.
JORDAN, WILLIAM F.....Assoc. M.	KITTREDGE, GEO. WATSON.....M.
JOY, JAMES F.....F.	KNAP, JOSEPH M.....M.
JUDSON, WM. PIERSON.....M.	KNAPP, LOUIS H.....M.
JUENGST, HENRY F.....M.	KNIGHT, ALBERT BRUCE.....M.
JUST, GEORGE A.....M.	KOBAYASHI, KAYAJIRO.....Jun.
	KONDO, TORAGORO.....Jun.
KARNER, WILLIAM J.....Assoc.	KUICHLING, EMIL.....M.
KASTL, ALEX. EDWARD.....M.	KYLE, GEO. A.....Assoc. M.
KATTÉ, WALTER.....M.	
KAUFMAN, GUSTAVE.....M.	LAFON, THOMAS.....M.
KEATING, EDWARD H.....M.	LAMB, RICHARD.....Assoc. M.
KEEFER, GEORGE A.....M.	LANDOR, EDWARD J.....M.
KEEFER, THOMAS C.....M.	LANDRETH, OLIN H.....M.
KEITH, GEORGE T.....M.	LANDRETH, WILLIAM B.....M.
KEITH, HERBERT C.....M.	LANT, FRANK P.....Jun.
KELLEY, HOWARD G.....M.	LASSIG, MORITZ.....M.
KELLEY, WILLIAM D., Jr.....M.	LATCHA, JACOB A.....M.
KELLOGG, CHARLES.....M.	LATHAM, HARRY H.....M.
KELLOGG, NORMAN B.....Jun.	LATHAM, NORMAN S.....Jun.
KELLY, CASSIUS W.....M.	LATROBE, CHARLES H.....M.
KELLY, JOHN P.....M.	LAWLOR, FRANCIS D. H.....Jun.
KELSEY, CLIFFORD S.....Jun.	LAWLOR, THOMAS F.....Jun.
KENDRICK, JOHN W.....M.	LAWTON, F. B.....Jun.
KENLY, WILLIAM WATRINS.....M.	LAWTON, WILLIAM H., Jr.....M.
KENNEDY, JOHN.....M.	LEAVITT, ERASMUS D.....M.
KENNEDY, WILLIAM H.....M.	LEAVITT, FRANK M.....M.
KERNOT, WILLIAM C.....M.	LE BARON, JOHN FRANCIS.....M.
KERR, H. H.....Assoc. M.	LE CONTE, LOUIS J.....M.
KHVEN, R., Jr.....Jun.	LEDLIE, CHARLES H.....M.
KIBBE, AUG. S.....Jun.	LEDERLE, GEORGE A.....M.
KIELLAND, S. MUNCH.....M.	LEHLBACH, GUSTAF.....M.
KIERSTED, W.....M.	LEHNARTZ, FREDERICK W.....M.
KILLEBREW, SAMUEL.....M.	LELAND, GEORGE H.....Jun.
KIMBALL, FRANCIS W.....M.	LENTILHON, EUGENE.....Jun.
KIMBALL, GEORGE A.....M.	LEVERICH, GABRIEL.....M.
KIMBALL, GEORGE H.....M.	LEWIS, EUGENE C.....M.

LEWIS, EVERETT W.....M.	MANN, GEORGE E.....M.
LEWIS, FRANK C.....Assoc.	MANSFIELD, M. W.....M.
LEWIS, JAMES F.....Assoc.	MANSON, MARSDEN.....M.
LEWIS, SIDNEY F.....M.	MARINDIN, HENRY L.....M.
LIBBY, EDMUND D.....M.	MARPLE, WILLIAM M.....M.
LIGHT, ALEXANDER L.....M.	MARR, GEORGE A.....M.
LINCOLN, WILLIAM S.....M.	MARRIOTT, C. B.....Assoc.
LINDENBERGER, C. H.....Assoc.	MARSHALL, HORACE M.....M.
LINDENTHAL, GUSTAV.....M.	MARSLAND, EDWARD.....M.
LINVILLE, JACOB H.....M.	MARSTRAND, O. J.....M.
LIVINGSTON, J. I.....Assoc.	MARTIN, CHARLES C.....M.
LOCKE, AUGUSTUS W.....M.	MARTIN, ROBERT K.....M.
LOCKE, CHARLES A.....M.	MARTIN, W. B.....Jun.
LONG, DENNIS.....F.	MARVIN, CHARLES EZRA.....M.
LONG, THOMAS J.....M.	MASON, ARTHUR J.....M.
LOOMIS, HORACE.....M.	MASON, S. D.....M.
LOREE, LEONOR F.....M.	MASTEN, CORNELIUS S.....M.
LORINI, MARIO.....Jun.	MAURICE, CHARLES S.....M.
LOTZ, WILLIAM H.....M.	MAXIM, HIRAM S.....M.
LOVETT, THOMAS D.....M.	MAXSON, FRANK O.....M.
LOW, EMILE.....M.	MAXWELL, DAVID F.....M.
LOW, GORHAM P.....M.	MAXWELL, JAMES R.....M.
LOWETH, CHARLES F.....M.	MAY, WILLIAM A.....M.
LOWINSON, OSCAR.....Jun.	MCCALLA, R. C., Jr.....Assoc. M.
LOWRIE, H. C.....M.	MCCANN, THOMAS H.....M.
LUCAS, D. JONES.....M.	MCCCLINTOCK, WILLIAM E.....M.
LUCIUS, ALBERT.....M.	MCCCLURE, ROBERT J.....M.
LUDLOW, WILLIAM.....M.	MCCCLURE, WILBUR F.....M.
LUNDIE, JOHN.....M.	MCCOLLOM, THOMAS C.....M.
LUSK, JAMES LORING.....M.	MCCOMB, DAVID E.....M.
LUTZ, ULYSSES S.....M.	MCCONNELL, EDWARD T.....Jun.
LYDON, WILLIAM A.....Jun.	MCCOOL, DANIEL.....M.
LYNCH, M. L.....M.	MCCORMICK, GEORGE K.....Jun.
LYTE, FRANCIS A.....Assoc. M.	MCCULLOH, WALTER.....Jun.
	MCDONALD, HARRY P.....M.
MACDONALD, CHARLES.....M.	MCDONALD, HUNTER.....M.
MACFARLANE, JAMES.....M.	MCDONALD, JOHN A.....M.
MACKENZIE, ALEXANDER.....M.	MCDOWELL, NATHAN M.....M.
MACKENZIE, WILLIAM B.....Jun.	McFARLAND, B. W.....Jun.
MACKLIN, JOHN G.....M.	MCGRATH, WALLACE.....M.
MACLAY, WILLIAM W.....M.	MCGUIRE, JAMES C.....Jun.
MACLEOD, JOHN.....M.	McKEE, CHARLES HERNE.....M.
MACNAUGHTON, JAMES.....M.	McKEE, SAMUEL B.....M.
MACRITCHIE, CHARLES.....M.	McKENZIE, THEODORE H.....M.
MAGOVERN, EDWARD E.....Jun.	McKEOWN, THOMAS.....M.
MAIS, HENRY C.....M.	McKINNEY, ROBERT C.....Assoc.
MALLORY, GEORGE B.....M.	McLAIN, LOUIS R.....M.
MAN, ALBON PLATT, JR.....M.	McMATH, ROBERT E.....M.
MANLEY, HENRY.....M.	McMEEKIN, CHARLES W.....Jun.

McMILLAN, CHARLES.....	M.	MORRIS, GOUVERNEUR.....	M.
McMINN, THOMAS J.....	M.	MORRIS, HENRY G.....	M.
McNAIR, THOMAS S.....	M.	MORRIS, MARSHALL.....	M.
McNULTY, GEORGE W.....	M.	MORRIS, ROBERT C.....	M.
McVEAN, JOHN J.....	M.	MORRIS, S. FISHER.....	M.
MEAD, DANIEL W.....	Assoc. M.	MORRIS, THOMAS O.....	M.
MEIER, EDWARD D.....	M.	MORSE, BENJAMIN F.....	M.
MEIGS, MONTGOMERY.....	M.	MORSE, CHARLES J.....	M.
MELVIN, DAVID N.....	M.	MORSE, HENRY G.....	M.
MENDELL, GEORGE H.....	M.	MORSS, FOSTER.....	M.
MENOCAL, ANICETO G.....	M.	MOSES, JOHN C.....	Jun.
MERIWETHER, NILES.....	M.	MOSMAN, ALONZO T.....	M.
MERRILL, GEORGE N.....	M.	MOSSCROP, ALFRED M.....	Jun.
MERRILL, WILLIAM F.....	M.	MOULTHROP, GEORGE E.....	Jun.
MERRITT, GEORGE.....	F.	MOULTON, MACE.....	M.
MERRIMAN, MANSFIELD.....	M.	MOYLAN, JAMES.....	M.
MERSEREAU, CHARLES V.....	M.	MOXHAM, ARTHUR J.....	Assoc.
METCALF, WILLIAM.....	M.	MÜNSTER, A.....	M.
MEYER, HENRY C.....	F.	MURDOCH, GILBERT.....	M.
MEYER, THOMAS C.....	M.	MYERS, CHARLES H.....	M.
MILLARD, CURTISS.....	Jun.	MYERS, E. T. D.....	M.
MILLER, ALEXANDER M.....	M.	MYERS, EDMUND T. D., Jr.....	Jun.
MILLER, CLIFFORD N.....	Jun.		
MILLER, HARRY IRVING.....	M.	NASH, CHARLES H.....	M.
MILLER, J. IMBRIE.....	M.	NAYLOR, E. B.....	Jun.
MILLER, REUBEN.....	M.	NEARING, FRANK.....	M.
MILLER, REUBEN, Jr.....	Jun.	NEILSON, CHARLES.....	M.
MILLER, RUDOLPH P.....	Jun.	NEILSON, ROBERT.....	M.
MILLER, SILVANUS.....	M.	NEUMEYER, R. E.....	Jun.
MILLER, SPENCER.....	Assoc.	NELLES, GEORGE T.....	M.
MILLS, ARTHUR L.....	M.	NEWELL, JOHN.....	M.
MILLS, CHARLES M.....	M.	NEWHAM, CHARLES E.....	M.
MILLS, JAMES E.....	M.	NEWMAN, ROBERT M.....	M.
MINTURN, ROWLAND R.....	M.	NEWTON, JOHN.....	Hon. M.
MITCHELL, EDWIN.....	Assoc. M.	NEXSEN, ELBERT.....	M.
MITCHELL, HENRY.....	M.	NICHOL, JOHN.....	M.
MODJESKI, RALPH.....	Assoc. M.	NICHOLS, OTHNIEL F.....	M.
MOFFET, JAMES D.....	Assoc. M.	NICHOLS, NORMAN J.....	M.
MOHUN, EDWARD.....	M.	NICHOLS, WILLARD A.....	M.
MONTFORT, RICHARD.....	M.	NICHOLSON, GEORGE B.....	M.
MONTONY, L. G.....	Jun.	NICOL, THOMAS W.....	Assoc.
MOORE, CHARLES E.....	M.	NICOLLS, WILLIAM J.....	M.
MOORE, JAMES.....	M.	NOBLE, ALFRED.....	M.
MOORE, ROBERT.....	M.	NORMAN, GEORGE H.....	M.
MORAN, D. E.....	Assoc. M.	NORRIS, ROBERT VAN A.....	Jun.
MORISON, GEORGE S.....	M.	NORTH, EDWARD P.....	M.
MORLEY, FRED.....	Assoc. M.	NORTHRUP, H. F.....	M.
MORRILL, GEORGE S.....	M.	NORTHWAY, WILLIAM R.....	M.
MORRIS, CHARLES J. A.....	M.	NOURSE, EDWIN G.....	M.

NOYES, ALBERT F.....M.	PENNYPACKER, LEVIS P.....Assoc. M.
NOYES, ELLIS B.....M.	PERKINS, CHARLES P.....M.
NYE, ALGERNON S., Jr.....Jun.	PERKINS, P. S.....Jun.
	PERKINS, THOMAS A.....Assoc. M.
OASTLER, WM. CHURCHILL.....Assoc.	PETERSON, P. ALEX.....M.
OCKERSON, JOHN A.....M.	PETRY, ALFRED.....M.
ODELL, FREDERICK S.....M.	PETTIT, ROBERT E.....M.
OESTREICH, HENRY L.....Jun.	PEW, ARTHUR.....M.
O'HANLY, JOHN L. P.....M.	PHILLIPS, A. E.....Jun.
OLNEY, GEORGE R.....M.	PHILLIPS, HENRY A.....Assoc.
OLNEY, LAFAYETTE.....M.	PHILLIPS, H. C.....Jun.
OB DYKE, STACY B., Jr.....M.	PICKETT, WILLIAM D.....M.
ORANGE, JAMES.....M.	PIERSON, GEORGE S.....M.
ORBISON, THOMAS W.....M.	PIERSON, STEPHEN C.....Jun.
O'ROURKE, JOHN F.....M.	PIHL, OLAF R.....M.
OSBORN, FRANK C.....M.	PIKE, WILLIAM A.....M.
OSGOOD, JOSEPH O.....M.	PITNEY, F. V.....Jun.
OSTRANDER, JOHN E.....Assoc. M.	PLAYLE, EDWARD F.....M.
OSTROM, JOHN N.....M.	PLYMPTON, GEORGE W.....M.
OWEN, FREDERICK N.....M.	POE, ORLANDO M.....M.
OWEN, JAMES.....M.	POETSCH, CHARLES J.....M.
OWENS, HENRY K.....M.	POLE, W. H.....Jun.
	POLLEDO, YSIDORO.....Jun.
PACKARD, RALPH G.....M.	POMEROY, LEWIS R.....Assoc.
PAINE, ARTHUR B.....M.	PONTZEN, ERNEST.....Cor. M.
PAINE, CHARLES.....M.	POPE, WILLARD S.....M.
PAINE, GEORGE H.....Jun.	PORTER, A. H.....Assoc. M.
PALMER, CORNELIUS.....M.	PORTER, ALBERT H.....M.
PANI, CAMILO E.....Jun.	PORTER, J. M.....Assoc. M.
PARENT, ETIENNE HENRI.....M.	POST, ANDREW J.....M.
PARET, MILNOR P.....M.	POST, JAMES C.....M.
PARISH, WAINWRIGHT.....Jun.	POST, LEVI W.....M.
PARKER, ANDREW McC.....M.	POTTER, ALEXANDER.....Assoc. M.
PARKER, CHARLES F.....Jun.	POTTER, HENRY W.....M.
PARKER, C. O.....M.	POTTS, JOSEPH D.....M.
PARKER, MAURICE S.....M.	POWELL, CHARLES F.....M.
PARKHURST, HENRY WILLIAMS.....M.	POWERS, JOSEPH A.....M.
PARSONS, GEORGE W.....Assoc.	POYNOR, D. A.....M.
PARSONS, HENRY C.....M.	PRATT, MASON DELANO.....Jun.
PARSONS, SIDNEY A.....Assoc. M.	PRATT, ROBERT J.....Assoc.
PARSONS, WM. BARCLAY.....M.	PRATT, WILLIAM A.....M.
PARTRIDGE, JOHN A.....M.	PRENDERGAST, FRANCIS E.....M.
PATTEN, HENRY B.....M.	PRENTISS, F. H.....M.
PATTERSON, JOHN CURTIS.....M.	PREVOST, SUTHERLAND M.....M.
PEARL, JAMES W.....M.	PRICE, PHILIP M.....M.
PEARSONS, GALEN W.....M.	PRINCE, EDWARD.....M.
PEARY, ROBERT E.....M.	PRINCE, JULUS.....Jun.
PEGRAM, GEORGE H.....M.	PRINDLE, FRANKLIN C.....M.
PENNY, WILLIAM W.....Jun.	PRIOR, CHARLES H.....M.

PROBASCO, SAMUEL R.....M.	RINECKER, FRANCIS.....M.
PROSSER, THOMAS F.	RISER, K. S.....M.
PROUT, HENRY G.....M.	RITCHIE, JAMES.....M.
PURDON, CHARLES D.....M.	RIVES, ALFRED L.....M.
PURDY, CORYDON T.....Jun.	ROBERTS, EVELYN P.....M.
PURSLow, ERNEST J. S.....Jun.	ROBERTS, NATHANIEL.....Assoc. M.
PUTNAM, JOSEPH W.....Assoc.	ROBERTS, PERCIVAL, Jr.....M.
	ROBERTS, WILLIAM.. . . .Assoc.
QUIMBY, HENRY H.....M.	ROBINSON, ALBERT A.....M.
QUINTUS, JOHN CHARLES.....M.	ROBINSON, ALBERT F.....M.
	ROBINSON, A. W.....M.
	ROBINSON, GEORGE H.....M.
RAASLOFF, HAROLD E. DE..... Jun.	ROBINSON, HOLTON DUNCAN.....Jun.
RADENHURST, WILLIAM N.....M.	ROBINSON, JOHN JM.
RAFTER, GEORGE W.....M.	ROBINSON, STILLMAN W.....M.
RAMSEY, JOSEPH, JR.....M.	ROCKWELL, SAMUEL.....M.
RANDOLPH, BEVERLY S.....M.	RODD, THOMASM.
RANDOLPH, L. S.....M.	ROEHM, GEORGE E.....Jun.
RAY, NATHANIEL C.....M.	ROGERS, FAIRMAN.....M.
RAYMOND, CHARLES WARD.....M.	ROGERS, MERRITT H.....M.
RAYMOND, CHARLES WALKER.....M.	ROGERS, W. A.....Jun.
REA, SAMUELM.	ROGGE, J. C. L.....Jun.
READ, ROBERT L.....M.	ROHNERT, BENNO Jun.
REECE, BENJAMIN.....M.	ROOD, HENRY M.....M.
REED, HENRY WADSWORTH.....M.	ROSE, CHARLES C.....M.
REED, WILLIAM W.....F.	ROSECRANS, WILLIAM S.....M.
REEVES, DAVIDM.	ROSENBERG, FREDERICH.... Assoc. M.
REEVES, PAUL S.....Assoc.	ROSENZWEIG, ALFRED.....Jun.
REYNDERS, J. V. W.....Assoc.	ROSEWATER, ANDREW.....M.
RHODES, BENJAMIN.....M.	ROSS, ELMER W.....Assoc. M.
RICE, EDWARD C.....M.	ROSS, JAMES.....M.
RICE, GEORGE S.....M.	ROTCH, WILLIAM.....M.
RICE, LEWIS FREDERICKM.	ROTHWELL, RICHARD P.....M.
RICE, WALTER P.....M.	ROWE, R. D.....M.
RICH, WATSON W.....M.	ROWE, SAMUEL MM.
RICHARDS, JOSEPH R.....Assoc.	ROWLAND, CHARLES B.....Jun.
RICHARDS, H. TUDOR.....M.	ROWLAND, CHARLES L.....M.
RICHARDSON, B. FRANK.....M.	ROWLAND, THOMAS F.....M.
RICHARDSON, CLIFFORD.....Assoc.	ROWLAND, THOMAS F., Jr.....M.
RICHARDSON, HENRY BM.	RUDLOFF, HENRY F.....M.
RICHARDSON, THOMAS F.....M.	RUGGLES, WILLIAM BM.
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FELLOWS.—*Louisville*—James W. Ainslie, William R. Belknap, T. C. Coleman, Bidermann du Pont, Dennis Long.

LOUISIANA.

MEMBERS.—*New Orleans*—Benjamin M. Harrod, Sidney F. Lewis, Henry B. Richardson.

ASSOCIATE MEMBER.—George Goodell Earl.

ASSOCIATE.—*New Orleans*—Joseph W. Putnam.

MAINE.

MEMBERS.—*Bangor*—Thomas W. Baldwin, Wilson Crosby, Joseph N. Greene ; *Gardiner*—Frederic Danforth ; *Houlton*—Moses Burpee ; *Lisbon Falls*—Fred. H. Baldwin ; *Portland*—William Albert Allen, A. C. Both, Francis S. Burrowes, Peter C. Hains, Edward C. Jordan.

MARYLAND.

MEMBERS.—*Baltimore*—John B. Bott, Mendes Cohen, Albert N. Connett, William P. Craighill, James G. Dagron, Henry T. Douglas, Francis H. Hambleton, George B. Hazlehurst, Thomas P. Kinsley, Charles H. Latrobe, Robert K. Martin, Charles H. McKee, Milnor P. Paret, L. S. Randolph, Frederick H. Smith, Thomas D. Whistler; *Frostburg*—Beverly S. Randolph.

ASSOCIATE MEMBERS.—*Baltimore*—Janon Fisher, D. W. Hemming.

ASSOCIATES.—*Baltimore*—Clayton C. Hall, Clarence Boyd Marriott.

JUNIORS.—*Baltimore*—Arthur V. Abbott, H. S. Farquhar, Clinton Levering Riggs, Arthur L. Shreve; *Ellicott City*—James C. McGuire.

MASSACHUSETTS.

MEMBERS.—*Boston*—C. Frank Allen, David H. Andrews, Thomas Aspinwall, H. Bissell, Dexter Brackett, William H. Bradley, Fred. Brooks, Henry H. Carter, John E. Cheney, Eliot C. Clarke, S. Clarence Ellis, George E. Evans, John R. Freeman, Joseph P. Frizell, Frank L. Fuller, Frank W. Hodgdon, Arthur Hodges, Gilbert Hodges, Edward W. Howe, Arthur H. Howland, William Jackson, Herbert C. Keith, George A. Kimball, Henry Manley, William E. McClintock, Thomas C. McCollom, George S. Morrill, Franklin C. Prindle, George S. Rice, L. Fred Rice, William Rotch, J. Parker Snow, Otto F. Sonne, Frederic P. Stearns, George Fillmore Swain, Charles H. Swan, Lucien A. Taylor, Marshall M. Tidd, S. E. Tinkham, E. K. Turner, Joseph Veazie, William Watson, Frank O. Whitney, Charles J. H. Woodbury; *Brockton*—E. L. Brown; *Brookline*—Desmond FitzGerald; *Cambridge*—William H. Burr, John C. Wait; *Cambridgeport*—Erasmus D. Leavitt; *Charlestown*—Thomas Doane; *Gloucester*—Gorham P. Low; *Great Barrington*—Frank W. Whitlock; *Holyoke*—Nathan H. Whitten; *Lawrence*—Richard A. Hale; *Lynn*—Charles W. Gay; *North Adams*—Augustus W. Locke; *Roxbury*—Henry Mitchell; *Sharon*—Edward S. Safford; *Somerville*—Charles D. Elliot, Wilbur F. Goodrich; *South Framingham*—Simpson C. Heald; *Springfield*—George N. Merrill, Mace Moulton; *Turner's Falls*—Charles W. Hazelton; *Westboro*—Ellery C. Appleton; *West Newton*—Albert F. Noyes; *Woburn*—Waldo E. Buck; *Worcester*—Charles A. Allen, George H. White.

ASSOCIATES.—*Boston*—Henry A. Phillips, Joseph R. Richards; *Waltham*—William Roberts.

JUNIORS.—*Boston*—Ernest W. Bowditch, B. W. Guppy, G. F. Haynes; *East Cambridge*—John Blodgett; *Malden*—William B. Fuller; *Northampton*—William B. Jewett.

FELLOWS.—*Montague City*—B. N. Farren; *New Bedford*—George Howland, Jr.; *Worcester*—Stephen Holman.

MICHIGAN.

MEMBERS.—*Ann Arbor*—Charles E. Greene; *Benton Harbor*—James W. Pearl; *Coldwater*—Jacob A. Latcha; *Detroit*—A. B. Atwater, Benjamin Douglas, Charles Phelps Gilbert, James D. Hawks, D. Farrand Henry, Frederick B. Howard, William Ludlow, Orlando Metcalfe Poe, Willard S. Pope, Arthur H. Scott, Charles W. Walton, George Y. Wisner; *Escanaba*—Cornelius Palmer; *Grand Rapids*—James H. Covode, Frederick W. Lehnartz, John J. McVean; *Houghton*—George A. Marr; *Jackson*

—Robert M. Newman; *Kalamazoo*—George S. Pierson; *Marquette*—Horatio Seymour; *Sault Ste. Marie*—Ebenezer S. Wheeler; *Traverse City*—Herbert Franklin Northrup.

ASSOCIATE MEMBERS.—*Ann Arbor*—Fred Morley; *Grand Rapids*—L. W. Goddard.

ASSOCIATES.—*Detroit*—Cassius H. Lindenberger; *Saginaw*—George L. Burrows.

JUNIORS.—*Ann Arbor*—Joseph B. Davis; *Detroit*—John C. Moses, Gabriel C. Tuthill, Job Tuthill; *Jackson*—Elstner Fisher; *Sault Ste. Marie*—Benno Rohnert.

FELLOW.—*Detroit*—James F. Joy.

MINNESOTA.

MEMBERS.—*Austin*—Francis W. Kimball; *Duluth*—Everett W. Lewis; *Minneapolis*—Fred. A. Camp, George W. Cooley, John T. Fanning, Olaf Hoff, Elbert Nexsen, William A. Pike, Charles H. Prior, Watson W. Rich; *St. Paul*—Charles L. Annan, Robert B. C. Bement, Henry M. Byllesby, Howard Nixon Elmer, Charles F. Loweth, Charles J. A. Morris, A. Münster, Leonard W. Rundlett, Joseph S. Sewell, David C. Shepard, Horace E. Stevens, George L. Wilson.

ASSOCIATE MEMBER.—*St. Paul*—Max Toltz.

FELLOW.—*St. Paul*—James J. Hill.

MISSISSIPPI.

MEMBERS.—*Greenville*—Arthur Hider, Robert Somerville, William Starling; *Natchez*—William Dunbar Jenkins; *Vicksburg*—Henry St. L. Coppée, Horace M. Marshall, Linton W. Stubbs.

JUNIOR.—*Vicksburg*—Walter H. Polk.

MISSOURI.

MEMBERS.—*Columbia*—Thomas Lafon; *Joplin*—W. C. Wetherill; *Kansas City*—John W. Andrews, Daniel Bontecou, Timothy C. Bradley, Robert Gillham, Joseph W. Hoover, W. Kiersted, Arthur J. Mason, Galen W. Pearsons, Frederick E. Sickels, John A. L. Waddell, Samuel H. Yonge; *Oakland*—Jacob Blickensderfer; *St. Joseph*—S. Waters Fox, Henry F. Juengst; *St. Louis*—Winthrop Bartlett, Anthony H. Blaisdell, Charles I. Brown, George Burnet, Ben. L. Crosby, Daniel McN. Currie, Norman W. Eayrs, Edward Flad, Henry Flad, Carl Gayler, William T. Gould, Edward A. Hermann, John F. Hinckley, M. L. Holman, John B. Johnson, George A. Lederle, Charles H. Ledlie, William S. Lincoln, Thomas J. Long, Robert E. McMath, Edward D. Meier, Charles V. Merscreau, Alexander M. Miller, Robert Moore, John A. Ockerson, George H. Pegram, Edward C. Rice, S. Bent Russell, Julius W. Schaub, Isaac A. Smith, Clinton F. Stephens, Robert L. Van Sant, James W. Way, Orlando B. Wheeler.

ASSOCIATE MEMBER.—*St. Louis*—Julius Baier.

ASSOCIATE.—*St. Louis*—C. M. Woodward.

JUNIORS.—*Kansas City*—Gilbert J. Bell, Edward Butts, Lee Treadwell; *St. Charles*—Sandford Horton; *St. Louis*—Western Radford Bascome, William W. Penney.

FELLOW.—*St. Louis*—Edward W. Coit.

MONTANA.

MEMBERS.—*Butte*—Francis W. Blackford, Albert Bruce Knight, James MacFarlane, Nathaniel C. Ray, Elliott H. Wilson; *Great Falls*—Maurice S. Parker; *Helena*—

Elbridge Harlow Beckler, William A. Haven, George H. Robinson ; *Marysville*—George H. Robinson.

ASSOCIATE MEMBER.—*Butte*—Eugene Carroll.

JUNIOR.—*Butte*—George E. Moulthrop.

NEBRASKA.

MEMBERS.—*Lincoln*—Edward Gillette, Jr. ; *Omaha*—Andrew Rosewater.

NEW HAMPSHIRE.

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ASSOCIATES.—*Hanover*—Robert Fletcher, John V. Hazen.

NEW JERSEY.

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ASSOCIATE MEMBERS.—*East Orange*—Albert Carr ; *Hoboken*—W. F. Whittemore ; *Montclair*—J. Waldo Smith ; *Jersey City*—Martin L. Gardner, Nathaniel Roberts ; *Red Bank*—Thomas H. Grant.

ASSOCIATES.—*Bound Brook*—J. I. Livingston ; *Glen Ridge*—Henry B. Hammond ; *Jersey City*—H. Comer ; *Princeton*—Herbert Stearns Squier Smith, Frederick Newton Willson ; *Schraudenburg*—S. S. Bogart.

JUNIORS.—*Elizabeth*—Charles B. Bonnett, Louis B. Bonnett ; *Hoboken*—Charles R. Bettes, John J. Tallon ; *Jersey City*—W. B. Martin, William H. Starr ; *Keyport*—Charles H. Jewett ; *Montclair*—James Berrall, Morris Knowles ; *Morristown*—Frederic Vernon Pitney ; *Newark*—William Pierson Field, Frank W. Kinsey, Warren Rue Kinsey, Aaron J. Zabriski ; *Paterson*—George H. Blakeley, St. John Clarke, Hugo S. Speidel ; *South Orange*—Edward E. Magovern ; *Princeton*—George S. Wilkins.

FELLOWS.—*High Bridge*—William J. Taylor ; *New Brunswick*—McRee Swift ; *Paterson*—James Watson.

NEW MEXICO.

MEMBER.—*East Las Vegas*—Emerson W. Grant.

JUNIOR.—*Albuquerque*—William F. Behrens.

NEW YORK.

HONORARY MEMBERS.—*Brooklyn*—Julius W. Adams ; *New York*—Allan Campbell, James C. Duane, John Newton, William C. Young.

MEMBER.—*New York City*—George R. Olney.

MEMBERS.—*Albany*—Horace Andrews, George I. Bailey, George P. Hilton, James MacNaughton, Henry C. Parsons, Charles F. Stowell, Elnathan Sweet, Alexander J. Swift, Arthur S. C. Würtele; *Brooklyn*—Peter C. Asserson, Frederick S. Benson, Van Brunt Bergen, L. Russell Clapp, Francis D. Fisher, J. Foster Flagg, Bentley D. Hassell, Warren E. Hill, Frank M. Leavitt, G. Leverich, O. J. Marstrand, Charles C. Martin, Othniel F. Nichols, George W. Plympton, Samuel R. Probasco, Charles L. Rowland, Thomas F. Rowland, Thomas F. Rowland, Jr., George S. Skilton, Lucius A. Smith, A. A. Stuart, Alfred T. Tomlinson, Robert Van Buren, Ignacio M. de Varona; *Buffalo*—George S. Field, Samuel J. Fields, George S. Gatchell, Edward B. Guthrie, Edmund Hayes, S. Munch Kielland, Paul S. King, Louis H. Knapp, George E. Mann, Thomas McKeown, T. Guilford Smith, Oscar F. Whitford, Francis M. Wilder; *Caledonia*—Calvin E. Brodhead; *Carmel*—Alfred Craven; *Castile*—William W. Walker; *Cherry Valley*—A. Beekman Cox; *Constableville*—Casimir Constable; *Elmira*—E. E. Buchanan; *Florida*—E. N. Kirk Talcott; *Geneseo*—John Young; *Geneva*—Charles T. Church; *Hoosick Falls*—Nathaniel E. Russell; *Ithaca*—Charles L. Crandall, Estevan A. Fuertes, Fred Putnam Spalding, Robert H. Thurston; *Jamestown*—Edward C. Burns; *Kingston*—Edward B. Codwise; *Lansingburgh*—Joseph A. Powers; *Linoleumville*—David N. Melvin; *Long Island City*—Porter D. Ford; *Middletown*—Edward Canfield, Lafayette Olney; *Mineville*—Samuel B. McKee; *Mt. Vernon*—Frederick S. Odell; *Newburgh*—John D. Van Buren; *New Rochelle*—Horace Crosby; *New York*—Job Abbott, Calvin H. Allen, Henry N. Babcock, William J. Baldwin, Oliver W. Barnes, Charles J. Bates, George S. Baxter, Leonard F. Beckwith, John A. Bense, Louis De Coppel Berg, Richard M. Berrian, John Bogart, Alfred P. Boller, W. H. Breithaupt, Josiah A. Briggs, Alex. G. Brinckerhoff, H. Waller Brinckerhoff, Charles O. Brown, Thomas E. Brown, Jr., Andrew Bryson, Carl W. Buchholz, Leffert L. Buck, George W. Catt, James E. Childs, Benjamin S. Church, Jacob M. Clark, Thomas C. Clarke, Francis Collingwood, Cyrus B. Comstock, Theodore Cooper, George B. Cornell, J. James R. Croes, Foster Crowell, John Y. Culyer, Joseph P. Davis, Clarence Delafield, S. L. F. Deyo, Pomeroy P. Dickinson, Edward B. Dorsey, James Duane, C. Wheeler Durham, Thomas Egleston, Charles E. Emery, Henry H. Farnum, M. N. Forney, John D. Fouquet, Arthur J. Frith, Alphonse Fteley, Eugene F. Fuller, Henry J. Gielow, E. Sherman Gould, Charles H. Graham, William H. Grant, Benjamin D. Greene, Francis V. Greene, G. S. Greene, Jr., Charles A. Hagne, Stephen S. Haight, H. S. Haines, William G. Hamilton, George Edward Harding, George R. Hardy, Robert L. Harris, Bentley D. Hasell, William J. Haskins, Charles H. Haswell, Arthur Haviland, R. Somers Hayes, W. W. Hegeman, Rudolph Hering, Clemens Herschel, Sidney W. Hoag, Jr., Charles Warren Hunt, William R. Hutton, Lewis B. Jackson, George A. Just, Walter Katté, Joseph M. Knap, Horace Loomis, Albert Lucius, Charles Macdonald, William W. Macley, George B. Mallory, Daniel McCool, Thomas J. McMinn, George W. McNulty, Thomas C. Meyer, James Moylan, Charles H. Myers, Charles E. Newham, Edward P. North, John F. O'Rourke, Joseph O. Osgood, John N. Ostrom, Ralph G. Packard, Arthur B. Paine, Charles Paine, Andrew McC. Parker, W. Barclay Parsons, Edward F. Playle, Andrew J. Post, Levi W. Post, F. H. Prentiss, Henry G. Prout, Alfred L. Rives, Richard P. Rothwell, Thomas F. Rowland, William L. Saunders,

Albert C. Savage, A. A. Schenck, Henry B. Seaman, Horace See, Alfred H. Simpson, Frank W. Skinner, Albert M. Smith, D. Lowber Smith, Charles SooySmith, Julio F. Sorzano, Samuel Spencer, John H. Staats, Robert P. Staats, Charles W. Staniford, Robert B. Stanton, David McNeely Stauffer, John M. Stewart, Cook Talcott, Joseph R. Thomas, Samuel C. Thompson, George H. Thomson, John Thomson, Stevenson Towle, John G. Van Horne, Theodore Voorhees, John F. Ward, Frederick W. Watkins, Samuel C. Weiskopf, Arthur M. Wellington, Schuyler S. Wheeler, William H. Wiley, F. Stuart Williamson, William E. Worthen; *Niagara Falls*—William A. Brackenridge, George B. Burbank, Frank H. Clement, Benjamin Rhodes; *Oswego*—William Pierson Judson, Charles D. Ward; *Palenville*—Gaylord Thompson; *Purdy's Station*—Frank S. Washburn; *Rochester*—John F. Alden, Robert Cartwright, Edwin A. Fisher, J. Herbert Grant, William E. Hoyt, Emil Knichling, William N. Radenhurst, George W. Rafter, J. Nelson Tubbs, Edmund F. Van Hoesen; *Rome*—Charles Comstock Hopkins; *Schenectady*—J. Leland FitzGerald, William B. Landreth; *Sing Sing*—Charles S. Gowen, Edward Marsland, Evelyn P. Roberts; *Stapleton*—William S. Bacot; *Suffern*—James Smith Haring; *Syracuse*—William B. Cogswell, William Ryan Hill, Howard Soule, William A. Sweet; *Troy*—James A. Burden, David M. Greene, John P. Kelly, Palmer C. Ricketts; *Utica*—Richard Willette Sherman; *West New Brighton*—Martin Gay, Charles C. King; *West Troy*—Anthony Victorin; *Willetts Point*—William Murray Black, R. L. Hoxie; *Woodhaven*—John J. Robinson; *Yonkers*—William Henry Baldwin, Peter F. Brendlinger, Samuel L. Cooper, Frederick W. Watkins.

ASSOCIATE MEMBERS.—*Albany*—A. C. Cunningham; *Brooklyn*—Joseph Strachan; T. Kennard Thomson; *Buffalo*—Paul Voorhees; *Ithaca*—John Edward Hill; *Long Island City*—William A. Cattell; *Newburgh*—Harry Roberts Wheeler; *New York*—William A. Ayerigg, Howard J. Cole, Oscar Erlandsen, Richard Lamb, Daniel E. Moran, Levis P. Pennypacker, Nathaniel Roberts, Edmund Coffin Stout, E. E. Russell Tratman, Louis L. Tribus, Maurice A. Vielé, Clement I. Walker, Wm. de H. Washington, Albert Lowry Webster; *Niagara Falls*—Albert H. Porter; *Olean*—Alexander Potter; *Rochester*—William F. Jordan; *Syracuse*—Henry C. Allen; *Walden*—C. A. Cockroft; *White Plains*—J. M. Farley.

ASSOCIATES.—*Buffalo*—P. H. Griffin, Alan H. G. Hardwicke; *Elmira*—John M. Diven; *Greenbush*—Robert J. Pratt; *Ithaca*—Henry S. Jacoby; *New York*—Samuel S. Bogart, Henry R. Bradbury, Charles Whiting Bradley, Alfred G. Compton, J. Woodbridge Davis, James R. Dunn, Wilbur C. Fisk, George Henry Frost, William Gibson, Jr., John M. Goodell, Charles M. Harris, James F. Lewis, Spencer Miller, William Churchill Oastler, Lewis R. Pomeroy, F. Hopkinson Smith, Calvin Tomkins; *Troy*—Frederick S. Young; *Yonkers*—Jules Breuchand.

JUNIORS.—*Albany*—Pemberton Smith, Harry L. Van Zile; *Brewster*—Walter McCulloh, Algernon S. Nye, Jr.; *Brooklyn*—James C. Anderson, Norman S. Latham, George A. Tibbals, Samuel G. Tibbals, J. W. Tumbridge, Arthur S. Tuttle, William B. Yerance; *Buffalo*—Alfred B. Ellsworth, George Alfred Ricker, George Richard Sikes, Frederick K. Wing; *Carmel*—William Gray; *Croton*—Harvey Farrington; *Elmira*—Horace J. Howe; *Greenpoint*—Charles B. Rowland; *Hornellsville*—A. Prescott Folwell; *Islip*—Eugene R. Smith; *Ithaca*—Charles W. Sherman; *Middletown*—Louis D. Fouquet, Charles H. Smith; *Mt. Vernon*—John Fletcher Fairchild; *New York*—Thomas W. Allen, George Baum,

Frederick N. Blane, Werner Boecklin, William Clinton Brown, J. Maxwell Carrere, J. N. Hayward Cornell, R. Walter Crenzbaur, Chandler Davis, Charles Herbert Deans, Stancliff B. Downes, Walter L. Dusenbury, Carlos F. Ferrer, J. R. Furman, Conrad Hewitt, R. W. Hildreth, Henry W. Hodge, John J. Hopper, Clifford S. Kelsey, R. Khuen, Jr., Frank P. Lant, F. B. Lawton, Eugene Lentillon, Mario Lorini, Osear Lowinson, L. G. Montony, E. B. Naylor, Henry L. Oestreich, Wainwright Parish, Charles F. Parker, Julius Prince, Holton Duncan Robinson, John C. L. Rogge, Maxwell Smith, Richard C. St. John, Roger Tappan, Wolfgang G. Triest, Alfred W. Trotter, William C. Tucker, Downing Vaux, Henry Vier, Charles S. Warner, Frank W. Wilson, Preston K. Yates, H. W. York: *Niagara Falls*—A. Howell Van Cleve; *Port Henry*—Norman B. Kellogg; *Poughkeepsie*—William F. Booth, Thomas F. Lawlor; *Purdy's Station*—Edward E. de Lancey, Edwin Duryea, Jr., Robert Ridgway, Ira Alexander Shaler; *Rochester*—Will E. Crane, Alfred M. Mosserop, William J. Stewart, Boynton W. McFarland; *Yonkers*—Mario Lorini, Howard Crathorne Phillips, Merritt H. Smith.

FELLOWS.—*Albany*—John Bridgford; *Brooklyn*—Nathaniel Cheney; *Buffalo*—John J. Albright, Henry A. Richmond, B. C. Rumsey; *Ebura*—Alexander S. Diven; *New York*—Edward Dean Adams, Amzi Lorenzo Barber, Charles L. Colby, Edward Cooper, Harry G. Darwin, Charles R. Flint, Walter S. Gurnee, Collis P. Huntington, George Merritt, Henry C. Meyer, Thomas Prosser, John M. Toncey.

NORTH CAROLINA.

MEMBERS.—*Chapel Hill*—William Cain.

JUNIORS.—*Beaufort*—W. H. Chadbourne, Jr.; *Southport*—Mark Fergusson.

NORTH DAKOTA.

MEMBER.—*Graulin*—David W. Cunningham.

OHIO.

MEMBERS.—*Akron*—John H. Sample; *Brink Haven*—Charles E. Wells; *Bucyrus*—A. W. Robinson; *Canton*—Edward J. Lándor; *Cincinnati*—Truman H. Aldrich, Latham Anderson, William Archer, Ward Baldwin, John F. Barnard, C. C. F. Bent, Charles Blackwell, Louis F. G. Bousearen, Robert L. Engle, Samuel M. Felton, John W. Hill, George Watson Kittredge, Thomas D. Lovett, Charles Neilson, Joseph Ramsey, Jr., Robert L. Read, William B. Ruggles, Frederick C. Weir, Samuel Whinery; *Cleveland*—Clarence A. Carpenter, H. F. Dunham, Cyrus G. Force, Malcolm S. Greenough, Edward A. Handy, George H. Kimball, Marvin W. Kingsley, Leonor F. Loree, Benjamin F. Morse, Frank C. Osborn, Albert H. Porter, Walter P. Rice, James Ritchie, E. Tracy Seovill, William H. Searles, Jared A. Smith, Cady Staley, Charles H. Strong; *Columbus*—L. F. Fieser, Stillman W. Robinson, Christopher Champion Waite; *Ravenna*—De Witt C. Coolman; *Toledo*—Clifford Buxton, Christopher L. Gates, Arthur L. Mills, Samuel Rockwell, Charles A. Wilson; *Youngstown*—Walter L. Cowles; *Zanesville*—James K. Geddes.

ASSOCIATE MEMBERS.—*Canton*—Loomis E. Chapin, Harry Frease; *Cleveland*—George E. Gifford; *Columbus*—Robert Augustus Cummings; *Steubenville*—George C. Urquhart.

ASSOCIATES.—*Cleveland*—George H. Ely, H. W. King; *Columbus*—Frank C. Lewis; *Hamilton*—Robert C. McKinney.

JUNIORS.—*Cincinnati*—Nathaniel O. Goldsmith, F. W. Scarborough; *Cleveland*—William H. Stair, George W. Vaughan; *Columbus*—C. Newton Brown; *Hamilton*—Francis C. Trowbridge; *Toledo*—William G. Clark; *Youngstown*—C. E. Fowler.

OREGON.

MEMBERS.—*Portland*—Virgil G. Bogue, H. D. Bush, George L. Dillman, Franklin I. Fuller, J. Q. Jamieson, Olaf R. Pihl, Albert S. Riffle, Franklin Riffle, Alfred F. Sears, Isaac W. Smith, William P. Watson; *Roseburg*—George D. Emerson.

PENNSYLVANIA.

HONORARY MEMBER.—*Philadelphia*—W. Hasell Wilson.

MEMBERS.—*Allegheny City*—Charles Davis, Paul Didier, Arthur B. Starr; *Altoona*—Charles B. Dudley, Theodore N. Ely, Harvey Linton, Robert E. Pettit; *Athens*—Charles Kellogg, Charles S. Maurice; *Beaver Falls*—T. S. White; *Bethlehem*—Mansfield Merriman; *Bradford*—Frank Nearing; *Bryn Mawr*—J. Imbrie Miller; *Chambersburg*—Chauncey Ives; *Cheltenham*—Caspar W. Haines; *Cheswick*—Alfred P. Kirtland; *Drifton*—Eckley B. Coxe; *Easton*—Frank Firmstone; *Erie*—John C. Quintus; *Hazleton*—Thomas S. McNair; *Johnstown*—George E. Thackray; *Latrobe*—Guilliaem Aertsen; *League Island*—Robert E. Peary, Christopher C. Wolcott; *Lewistown*—Ellis B. Noyes; *New Brighton*—George M. Farley; *Pencoyd*—James Christie, Rob B. Davis, Charles C. Schneider; *Philadelphia*—Fred. J. Amweg, William S. Auchincloss, William F. Biddle, Maximilian F. Bonzano, Daniel P. Bruner, James Christie, Thomas M. Cleemann, Oren B. Colton, Charles G. Darrach, Joseph N. DuBarry, Louis P. Evans, Carl R. Grimm, Lewis M. Haupt, Washington Jones, Jacob H. Linville, D. Jones Lucas, Ulysses S. Lutz, Henry G. Morris, William J. Nicolls, Stacy B. Opdyke, Jr., John Curtis Patterson, Charles P. Perkins, Joseph D. Potts, William A. Pratt, Sutherland M. Prevost, Charles Walker Raymond, Samuel Rea, David Reeves, B. Frank Richardson, Percival Roberts, Jr., Fairman Rogers, Albert J. Scherzer, Coleman Sellers, William Sellers, Samuel L. Smedley, Joseph Shuter Smith, Russell Thayer, Charles Truesdell, Edward H. Williams, Henry W. Wilson, John A. Wilson, Joseph M. Wilson; *Phillipsburg*—Camille S. d'Invilliers; *Phoenixville*—Adolphus Bonzano, Amory Coffin, John Sterling Deans, Charles M. Mills, Henry H. Quimby, Samuel Tobias Wagner; *Pittsburgh*—Frank M. Ashmead, Max J. Becker, Edward M. Bigelow, Charles Blackwell, Alba Fisk Brown, George H. Browne, Wm. W. Card, Charles Davis, George S. Davison, Alexander Dempster, Charles C. Elwell, James H. Harlow, Frederick T. Hatch, Alfred E. Hunt, William H. Jennings, Thomas H. Johnson, Gustave Kaufman, Gustav Lindenthal, Nathan M. McDowell, William Metcalf, Reuben Miller, Thomas Rodd, Wm. Lucien Scaife, Felician Slataper, Edward B. Taylor, J. Wainwright, J. W. Walker, George Westinghouse, Jr., Wm. Glyde Wilkins, Joseph Wood; *Pottstown*—John E. Greiner; *Pottsville*—George Devin; *Reading*—Frank S. Stevens, A. Harvey Tyson; *Scottsdale*—Kenneth Allen; *Scranton*—James Archbald, William M. Marple, William A. May, Charles C. Rose, J. Gardner Sanderson; *South*

Bethlehem—H. Stanley Goodwin, W. H. Jaques; *St. Vincent*—Sebastien Wimmer; *Swarthmore*—Arthur Beardsley; *West Philadelphia*—George P. Bland; *Wilkes Barre*—Irving A. Stearns; *Williamsport*—Robert Neilson.

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ALFRED W. CRAVEN,* November 3, 1869, to November 1, 1871.
HORATIO ALLEN,* November 1, 1871, to November 5, 1873.
JULIUS W. ADAMS, November 5, 1873, to November 3, 1875.
GEORGE SEARS GREENE, November 3, 1875, to November 7, 1877.
E. S. CHESBROUGH,* November 7, 1877, to November 6, 1878.
W. MILNOR ROBERTS,* November 6, 1878, to November 5, 1879.
ALBERT FINK, November 5, 1879, to November 3, 1880.
JAMES B. FRANCIS,* November 3, 1880, to January 18, 1882.
ASHBEL WELCH,* January 18, 1882, to September 25, 1882.†
CHARLES PAINE, January 17, 1883, to January 16, 1884.
DON J. WHITTEMORE, January 16, 1884, to January 21, 1885.
FREDERIC GRAFF,* January 21, 1885, to January 20, 1886.
HENRY FLAD, January 20, 1886, to January 19, 1887.
WILLIAM E. WORTHEN, January 19, 1887, to January 18, 1888.
THOMAS C. KEEFER, January 18, 1888, to January 16, 1889.
MAX J. BECKER, January 16, 1889, to January 15, 1890.
WILLIAM P. SHINN,* January 15, 1890, to January 21, 1891.
OCTAVE CHANUTE, January 21, 1891, to January 20, 1892.
MENDES COHEN, January 20, 1892.

VICE-PRESIDENTS.

EDWARD GARDINER,* November 5, 1852, to November 2, 1853.
CHARLES W. COPELAND, November 5, 1852, to November 3, 1869.
ALFRED W. CRAVEN,* November 2, 1853, to November 6, 1867.
JULIUS W. ADAMS, November 6, 1867, to November 5, 1873.
JAMES B. FRANCIS,* November 3, 1869, to November 2, 1870, and November 6, 1878, to November 3, 1880.
THOMAS C. CLARKE, November 2, 1870, to November 1, 1871.
JACOB M. CLARK, November 1, 1871, to November 5, 1873.
W. MILNOR ROBERTS,* November 5, 1873, to November 1, 1876.
THEODORE G. ELLIS,* November 5, 1873, to November 7, 1877.
ALEXANDER L. HOLLEY,* November 1, 1876, to November 7, 1877.
ALBERT FINK, November 7, 1877, to November 5, 1879.

* Deceased.

† Mr. Ashbel Welch died September 25, 1882, during his term of office as President.

W. MILNOR ROBERTS,* November 7, 1877, to November 6, 1878.
 OCTAVE CHANUTE, November 5, 1879, to January 18, 1882.
 ASHBEL WELCH,* November 3, 1880, to January 18, 1882.
 WILLIAM H. PAINE,* January 18, 1882, to January 21, 1885.
 JAMES B. EADS,* January 18, 1882, to January 17, 1883.
 HENRY FLAD, January 17, 1883, to January 16, 1884.
 JOSEPH P. DAVIS, January 16, 1884, to January 21, 1885.
 G. S. GREENE, Jr., January 21, 1885, to January 20, 1886.
 THOMAS J. WHITMAN,* January 21, 1885, to January 20, 1886.
 THOMAS C. KEEFER, January 20, 1886, to January 18, 1888.
 THOMAS F. ROWLAND, January 20, 1886, to January 18, 1888.
 J. JAMES R. CROES, January 18, 1888, to January 16, 1889.
 ROBERT MOORE, January 18, 1888, to January 16, 1889.
 ALPHONSE FTELEY, January 16, 1889, to January 20, 1892.
 E. L. CORTHELL, January 16, 1889, to January 15, 1890.
 MENDES COHEN, January 15, 1890, to January 21, 1891.
 CHARLES HERMANY, January 21, 1891, to January 20, 1892.
 CHARLES B. BRUSH, January 20, 1892.
 SAMUEL WHINERY, January 20, 1892.
 SAMUEL M. GRAY, January 20, 1892.
 JOHN MACLEOD, January 20, 1892.

SECRETARIES.

ROBERT B. GORSUCH, November 5, 1852, to November 2, 1853.
 EDWARD GARDINER,* November 2, 1853, to December 1, 1854.
 JAMES O. MORSE,* December 1, 1854, to November 3, 1869.
 THOMAS C. MEYER, November 3, 1869, to January 5, 1870.
 ALFRED P. BOLLER, January 5, 1870, to November 1, 1871.
 GABRIEL LEVERICH, November 1, 1871, to November 7, 1877.
 JOHN BOGART, November 7, 1877, to January 21, 1891.
 F. COLLINGWOOD, January 21, 1891.

TREASURERS.

ROBERT B. GORSUCH, November 5, 1852, to November 2, 1853.
 EDWARD GARDINER,* November 2, 1853, to December 1, 1854.
 JAMES O. MORSE,* December 1, 1854, to November 3, 1875.
 JOHN BOGART, November 3, 1875, to November 7, 1877; January 21, 1891.
 J. JAMES R. CROES, November 7, 1877, to January 21, 1888.
 G. S. GREENE, Jr., January 18, 1888, to January 21, 1891.

DIRECTORS.

W. H. MORELL,* year beginning November, 1852.
 W. H. SIDELL,* “ “ “ “ 1852.
 JULIUS W. ADAMS, years “ “ “ “ 1852, 1875.
 JAMES P. KIRKWOOD,* “ “ “ “ 1852, to Nov., 1867.
 ALFRED W. CRAVEN,* “ “ “ “ 1852, 1867, 1868, 1871 and 1872.
 WILLIAM J. McALPINE,* years beginning November, 1853, to Nov., 1867, and Nov., 1869.
 WILLIAM H. TALCOTT,* “ “ “ “ 1853, to Nov., 1868.

* Deceased.

JAMES O. MORSE,*	years beginning Nov., 1853, to Nov., 1867, and Nov., 1876.
J. W. PRATT,*	" " " 1853.
I. C. CHESBROUGH,*	" " " 1854 to Nov., 1867.
JAMES K. FORD,	" " " 1867, 1868.
GEORGE SEARS GREENE,	" " " 1867, 1868, 1870, 1872, 1874, 1876, 1877, 1878.
JOHN F. WARD,	" " " 1867, 1868, 1869, 1870, 1871.
E. S. CHESBROUGH,*	" " " 1869.
THOMAS PROSSER,*	" " " 1869.
JACOB M. CLARK,	" " " 1869, 1870.
THOMAS F. ROWLAND,	" " " 1870, 1871, 1872.
CHARLES MACDONALD,	" " " 1870, 1873, 1874.
ALFRED P. BOLLER,	" " " 1871.
WILLIAM E. WORTHEN,	" " " 1871.
JOHN BOGART,	" " " 1872, 1873, 1874.
F. COLLINGWOOD,	" " " 1872, 1873, 1874, 1875.
DE VOLSON WOOD,	" " " 1873.
O. CHANUTE,	" " " 1873, 1874, 1875, Jan., 1885.
A. L. HOLLEY,*	" " " 1875.
Q. A. GILLMORE,*	" " " 1875.
W. MILNOR ROBERTS,*	" " " 1876.
J. JAMES R. CROES,	" " " 1876.
WILLIAM H. PAINE,*	" " " 1876, 1877, 1878, 1879, 1880.
M. N. FORNEY,	" " " 1876.
JOSEPH P. DAVIS,	" " " 1877, 1880, Jan., 1882, 1883.
C. SHALER SMITH,*	" " " 1877.
C. VANDERVOORT SMITH,*	" " " 1877, 1878, 1879, 1880.
THOMAS C. CLARKE,	" " " 1878.
THEODORE G. ELLIS,*	" " " 1878.
CHARLES HERMANY,	" " " 1879.
EDGAR B. VAN WINKLE,	" " " 1879.
GOVERNEUR K. WARREN,*	" " " 1879.
G. BOUSCAREN,	" " " 1880.
D. J. WHITTEMORE,	" " " 1880.
THOMAS C. KEEFER,	" " Jan., 1882.
THOMAS L. CASEY,	" " " 1882.
G. S. GREENE, Jr.,	" " " 1882, 1883, 1884, 1886.
GEORGE W. DRESSER,*	" " " 1882.
WILLIAM METCALF,	" " " 1883, 1884.
WILLIAM E. MERRILL,*	" " " 1883.
WILLIAM G. HAMILTON,	" " " 1883, 1887.
THEODORE COOPER,	" " " 1884, 1885.
FRED. GRAFF,*	" " " 1884.
WILLIAM R. HUTTON,	" " " 1884, 1885, 1886.
WALTER KATTE,	" " " 1885, 1889.
F. W. VAUGHAN,*	" " " 1885.
W. HOWARD WHITE,	" " " 1886.
HENRY G. MORRIS,	" " " 1886.
CHARLES L. STROBEL,	" " " 1886.

CHARLES C. SCHNEIDER,	year beginning Jan., 1887.
STEVENSON TOWLE,	" " " 1887, 1888.
JAMES ARCHBALD,	" " " 1887.
ROBERT FORSYTH,	" " " 1887.
MENDES COHEN,	" " " 1888.
JOSEPH M. WILSON,	" " " 1888.
CHARLES B. BRUSH,	" " " 1888, 1889, 1890, 1891.
ALPHONSE FTELEY,	" " " 1888.
ELIOT C. CLARKE,	" " " 1889.
ROBERT E. McMATH,	" " " 1889.
WILLIAM P. SHINN,*	" " " 1889.
THEODORE VOORHEES,	" " " 1890.
ROBERT VAN BUREN,	" " " 1890.
WILLIAM LUDLOW,	" " " 1890.
WILLIAM G. CURTIS,	" " " 1890.
RUDOLPH HERING,	" " " 1891.
CLEMENS HERSCHEL,	" " " 1891.
EDWARD P. NORTH,	" " " 1891.
S. WHINERY,	" " " 1891.
LEFFERT L. BUCK,	" " " 1892.
WM. P. CRAIGHILL,	" " " 1892.
DESMOND FITZGERALD.	" " " 1892.
ABRAHAM GOTTLIEB,	" " " 1892.
BENJAMIN M. HARROD,	" " " 1892.
JOHN THOMPSON,	" " " 1892.
THEODORE N. ELY,	" " " 1892.
GEORGE W. McNULTY,	" " " 1892.
ROBERT MOORE,	" " " 1892.
O. F. NICHOLS,	" " " 1892.
P. ALEX. PETERSON,	" " " 1892.
ROBERT L. READ,	" " " 1892.
E. A. FUERTES,	" " " 1892.
ALBERT B. HILL,	" " " 1892.
CHARLES H. MYERS,	" " " 1892.
E. T. D. MYERS,	" " " 1892.
JAMES D. SCHUYLER,	" " " 1892.
JOHN G. VAN HORNE,	" " " 1892.

* Deceased.

American Society of Civil Engineers.

DECEASED MEMBERS.

H.M., Honorary Member.

M., Member.

F., Fellow.

M. F., Member and Fellow.

A., Associate.

J., Junior.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
ABERT, J. J.	H. M.	Corps Engs. U. S. A.	Mar. 2, 1853.	Jan. 27, 1862
ACKENHEIL, CHARLES	M.	New York City.	Feb. 2, 1887.	June 20, 1890
AINSLIE, GEORGE	F.	Louisville, Ky.	May 28, 1872.	Sept. 7, 1878
ALLAIRE, WILLIAM M.	J.	New York City.	Mar. 2, 1881.	Dec. 14, 1884
ALLEN, HORATIO	H. M.	{ South Orange, } M. { N. J. } H. M.	Dec. 4, 1867. Mar. 4, 1874.	{ Dec. 31, 1889
ALLEN, THEODORE	M.	South St. Louis, Mo.	Nov. 16, 1870.	Sept. 18, 1890
ALLIS, EDWARD P.	F.	Milwaukee, Wis.	Aug. 4, 1883.	Apr. 1, 1889
ANDERSON, ADNA	M.	Sing Sing, N. Y.	Sept. 2, 1874.	May 15, 1889
ANSLEY, GEORGE D.	M.	Montreal, Canada.	Sept. 4, 1878.	Sept. 22, 1883
ARTHUR, WILLIAM Y.	M. F.	Brooklyn, N. Y.	{ M. Dec. 4, 1867. { F. Sept. 20, 1870.	{ Feb. 15, 1876
ASPINWALL, WM. H.	F.	New York City.	July 9, 1870.	Jan. 18, 1875
ATWOOD, WILLIAM H.	M.	Cleveland, Ohio.	May 4, 1881.	Sept. 4, 1890
AVERY, JOHN	M.	New York City.	Dec. 4, 1867.	Jan. 30, 1884
BACHE, ALEX. D.	H. M.	Washington, D. C.	Mar. 2, 1853.	Feb. 16, 1867
BAILEY, THOMAS N.	M.	Corps Eng. U. S. A.	Nov. 7, 1883.	Apr. 20, 1886
BAKER, WILLIAM L.	M.	Detroit, Mich.	{ J. Jan. 6, 1875. { M. Nov. 6, 1878.	{ May 28, 1888
BARBOUR, WILLIAM S.	M.	Cambridgeport, Mass.	Apr. 17, 1872.	Feb. 24, 1889
BARNARD, JOHN G.	H. M.	{ Corps Eng. } M. { U. S. A. } H. M.	Sept. 15, 1869. Apr. 17, 1873.	{ May 14, 1882
BARNES, JAMES	M.	Springfield, Mass.	Mar. 13, 1853.	Feb. 12, 1869
BAUMANN, EDWARD	A.	Chicago, Ill.	June 2, 1880.	Jan. 23, 1889
BAYLEY, GEORGE W. R.	M.	New Orleans, La.	July 10, 1872.	Dec. 14, 1876
BELKNAP, MORRIS S.	M.	Louisville, Ky.	Aug. 7, 1872.	July 19, 1890
BELL, JAMES E.	M.	Cincinnati, Ohio.	Mar. 3, 1879.	June 8, 1879
BENTLEY, HENRY A.	M.	Newport, R. I.	Mar. 2, 1881.	May 13, 1889
BERESFORD, FRANK	J.	Cincinnati, Ohio.	Sept. 7, 1887.	Dec. 12, 1887
BLUNDEN, HENRY D.	M.	Athens, Pa.	{ J. Jan. 5, 1876. { M. Feb. 4, 1880.	{ Jan. 7, 1889
BRIGGS, ALBERT D.	F.	Springfield, Mass.	May 17, 1870.	Feb. 20, 1881
BRIGGS, ROBERT	M.	Philadelphia, Pa.	Oct. 19, 1870.	July 24, 1882
BROUGH, REDMOND J.	M.	Toronto, Canada.	Sept. 1, 1880.	July 21, 1883

DECEASED MEMBERS.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
BROWN, JOHN M.	M.	Auburn, N. Y.	Apr. 1, 1874.	June 16, 1874
BUCKHOUT, ISAAC C.	M.	New York City.	July 10, 1872.	Sept. 27, 1874
BURDEN, HENRY	H. M.	Troy, N. Y.	Mar. 28, 1853.	Jan. 19, 1871
BURR, JAMES D.	M.	Topeka, Kans.	Apr. 5, 1876.	May 5, 1886
BUTTS, E. P.	J.	Burlington, Ia.	Nov. 3, 1886.	Jan. 11, 1892
CAMP, JONATHAN, JR.	M.	Jersey City, N. J.	July 2, 1873.	Apr. 16, 1874
CAITWRIGHT, HENRY	M.	Philadelphia, Pa.	Sept. 6, 1876.	July 30, 1881
CARY, EDGAR S.	M.	Newburgh, N. Y.	Nov. 1, 1882.	Jan. 5, 1883
CASS, GEORGE W.	F.	New York City.	Mar. 30, 1871.	Mar. 21, 1888
CHASE, S. STEWART	F.	Holyoke, Mass.	Dec. 8, 1868.	May 29, 1873
CHESBROUGH, E. S.	M.	Chicago, Ill.	June 17, 1868.	Aug. 18, 1886
CLARK, IRA E.	J.	San Francisco, Cal.	Feb. 6, 1878.	May 23, 1882
CLARKE, H. WADSWORTH	M.	Syracuse, N. Y.	Mar. 15, 1871.	Feb. 23, 1892
COCHRAN, A. P.	F.	Louisville, Ky.	June 19, 1872.	Apr. 26, 1889
COLBURN, WARREN	M.	Toledo, Ohio.	Mar. 18, 1868.	Sept. 16, 1879
COLBURN, ZERAH	M.	London, England.	Jan. 5, 1855.	Apr. 26, 1870
COLMAN, ISAAC D.	M.	New York City.	Feb. 17, 1869.	Apr. 8, 1875
CONNOR, ADDISON	M.	New York City.	Jan. 5, 1887.	Jan. 4, 1891
COOKE, ROBERT L.	M.	New York City.	Apr. 17, 1872.	Aug. 11, 1877
CORYELL, MARTIN	M.	Lambertville, N. J.	Dec. 4, 1867.	Nov. 30, 1886
COURTWRIGHT, MILTON	F.	New York City.	June 11, 1870.	Apr. 25, 1883
CRAVEN, ALFRED W.	M.	New York City.	Nov. 5, 1852.	Mar. 27, 1879
CRAVEN, HENRY S.	M.	New York City.	Dec. 5, 1884.	Dec. 7, 1889
CUSHING, OLIVER E.	M.	Lowell, Mass.	July 10, 1872.	Jan. 17, 1890
CUSHING, SAMUEL B.	M.	Providence, R. I.	Sept. 15, 1869.	July 17, 1873
CUSHING, SAMUEL B.	M.	Providence, R. I.	June 1, 1887.	Dec. 3, 1888
DAVIDSON, MATTHIAS O.	M.	New York City.	Apr. 6, 1853.	Sept. 1, 1872
DEARBORN, WILLIAM L.	M.	New York City.	Dec. 4, 1867.	Mar. 15, 1875
DERBISHIRE, STEWART	M.	Ottawa, Canada.	Apr. 2, 1884.	Jan. 7, 1887
DEXTER, GEORGE M.	M.	Boston, Mass.	Nov. 5, 1852.	Nov. 26, 1872
DICKINSON, GEORGE C.	M.	Cobham, Va.	Feb. 5, 1890.	Jan. 24, 1892
DILLON, SIDNEY	F.	New York City.	Mar. 26, 1870.	June 9, 1892
DIRKS, JUSTUS	H. M.	The Hague, Holl'd.	June 2, 1880.	Dec. 26, 1886
DRESSER, GEORGE W.	M.	New York City.	July 5, 1876.	Mar. 27, 1883
DURANT, THOMAS C.	F.	New York City.	Nov. 18, 1870.	Oct. 5, 1885
EADS, JAMES B.	M. F.	New York City {	Dec. 16, 1868. } Mar. 30, 1870. }	Mar. 8, 1887
EDGE, GEORGE W.	M.	Jersey City, N. J.	Mar. 4, 1874.	Jan. 1, 1880
ELLIOTT, GEORGE H.	M.	Norfolk, Va.	Apr. 4, 1883.	Oct. 7, 1886
ELLIS, NATHANIEL W.	M.	Manchester, N. H.	Feb. 2, 1881.	Jan. 16, 1889
ELLIS, THEODORE G.	M. F. {	Hartford, Conn. {	Feb. 17, 1869. } Nov. 21, 1872. }	Jan. 9, 1883
EMACK, CHARLES S.	M.	Culpepper, Va.	July 6, 1870.	July 27, 1877

Name.	Class.	Residence.	Date of Membership.	Date of Death.
EMMETT, THOMAS A.	M.	Carmel, N. Y.	Nov. 5, 1852.	Jan. 12, 1880
EMONTS, WM. A. G.	J.	Reading, Pa.	Sept. 6, 1876.	Nov. 5, 1887
ENSIGN, ELISHA W.	F.	Buffalo, N. Y.	May 18, 1870.	Oct. 1, 1877
ERICSSON, JOHN	H. M.	New York City.	Oct. 2, 1879.	Mar. 8, 1889
EVANS, WALTON W.	M. F.	{ New Rochelle, } { N. Y. }	{ M. Dec. 4, 1867. } { F. Mar. 15, 1870. }	{ Nov. 28, 1886 }
FALCONNET, EUGENE F.	M.	Nashville, Tenn.	June 3, 1874.	Oct. 14, 1887
FARGO, WILLIAM G.	F.	Buffalo, N. Y.	May 6, 1870.	Aug. 4, 1881
FARNHAM, HENRY	F.	Hartford, Conn.	Nov. 14, 1872.	Oct. 4, 1883
FARQUHAR, FRANCIS U.	M.	Corps Engs., U. S. A.	July 10, 1872.	July 3, 1883
FELTON, SAMUEL M.	F.	Philadelphia, Pa.	Mar. 23, 1870.	Jan. 24, 1889
FISHER, CHARLES H.	M.	Lansingburg, N. Y.	July 7, 1869.	Jan. 18, 1888
FLINT, EDWARD A.	M.	Brookline, Mass.	May 18, 1870.	Jan. 23, 1886
FOGG, CHARLES E.	M.	Poughkeepsie, N. Y.	Oct. 16, 1872.	Apr. 26, 1891
FORD, ARTHUR L.	A.	Panama.	Nov. 6, 1872.	May 30, 1880
FORSHEY, CALEB G.	M.	New Orleans, La.	Aug. 7, 1872.	Apr. * 1882
FRANCIS, JAMES B.	H. M.	Lowell, Mass. {	{ H. M. Apr. 5, 1892. } { M. Nov. 5, 1852. } { F. May 4, 1870. }	{ Sept. 19, 1892 }
FRENCH, EDMUND	M.	New York City.	Nov. 6, 1872.	May 30, 1880
FOWLER, CHARLES E.	M.	New Haven, Conn.	May 3, 1876.	Jan. 28, 1883
FROST, BENJAMIN D.	M.	North Adams, Mass.	Feb. 21, 1872.	July 19, 1880
GARDINER, EDWARD	M.	New York City.	Nov. 5, 1872.	*
GARDINER, HENRY A.	M.	Jackson, Mich.	Dec. 1, 1852.	July 26, 1875
GILLESPIE, JOSHUA L.	M.	St. Paul, Mich. {	{ J. Feb. 3, 1875. } { M. Apr. 2, 1884. }	{ Aug. 20, 1890 }
GILLIS, JOHN R.	M. F.	New York City. {	{ M. June 2, 1869. } { F. Mar. 15, 1870. }	{ July 16, 1870 }
GILLMORE, QUINCY A.	M.	New York City.	Dec. 2, 1868.	Apr. 7, 1888
GOODWIN, JOHN M.	M.	Sharpsville, Pa.	Sept. 4, 1872.	Oct. 21, 1891
GORRINGE, H. H.	A.	New York City.	Apr. 6, 1881.	July 6, 1885
GRAFF, FREDERIC	M.	Philadelphia, Pa.	May 7, 1873.	Mar. 30, 1890
GRAIN, WILLIAM	M.	Fergus, Ont., Can.	Sept. 15, 1869.	Jan. 10, 1877
GRASSAU, H.	M.	New Haven, Conn.	July 6, 1853.	May 16, 1870
GREENE, BENJAMIN H.	M.	Helena, Mont.	May 1, 1878.	Jan. 4, 1890
GREENWOOD, WM. H.	M.	Dummerston, Vt.	Mar. 3, 1880.	Aug. 29, 1880
GRIFFEN, JOHN	M.	Phoenixville, Pa.	Apr. 15, 1868.	Jan. 14, 1884
HADDOCK, ARBA R.	A.	New York City.	May 4, 1881.	Feb. 28, 1885
HALL, G. THOMAS	M.	New York City. {	{ A. Oct. 2, 1872. } { M. Sept. 2, 1874. }	{ June 2, 1881 }
HARBAUGH, SPRINGER	F.	St. Paul, Minn.	May 19, 1871.	Dec. 8, 1887
HARDEE, THOMAS S.	M.	New Orleans, La.	Apr. 4, 1877.	May 20, 1880

* Precise date of death unknown.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
HARRIS, HENRIQUE	M.	Brooklyn, N. Y.	Dec. 3, 1879.	Oct. 10, 1882
HASLETT, SULLIVAN	M.	Brooklyn, N. Y.	June 4, 1879.	Jan. 4, 1887
HATFIELD, ROBERT G.	M.	New York City.	Dec. 4, 1867.	Feb. 15, 1879
HAWKSHAW, SIR JOHN	H. M.	London, England.	Nov. 3, 1880.	June 2, 1891
HAYWARD, JAMES A.	M.	Galveston, Texas.	Sept. 5, 1877.	Aug. 13, 1880
HEGEMAN, ALLEN B.	M.	Totitlan, Mexico.	Feb. 1, 1888.	Oct. 22, 1892
HILGARD, JULIUS E.	M.	Washington, D. C.	July 10, 1872.	May 8, 1891
HUORTSBERG, MAX	M.	Chicago, Ill.	July 10, 1872.	May 16, 1880
HOE, RICHARD M.	M.	New York City.	Oct. 1, 1873.	June 8, 1886
HOLLEY, ALEXANDER L.	M.	Brooklyn, N. Y.	Oct. 1, 1873.	Jan. 29, 1882
HOWELL, CHARLES W.	M.	Corps Engs. U. S. A.	Mar. 3, 1875.	Apr. 5, 1882
HUMPHREYS, ANDREW A.	H. M.	Corps Engs. U. S. A.	May 7, 1873.	Dec. 27, 1883
HYDE, WILLIAM B.	M.	Oakland, Cal.	July 12, 1877.	June 1, 1882
JAMES, JOHN C.	M.	Battle Creek, Mich.	Mar. 1, 1876.	Feb. 27, 1883
JERVIS, JOHN B.	H. M.	Rome, N. Y. { M. H. M.	Dec. 4, 1867. Dec. 2, 1868.	{ Jan. 12, 1885
JOHNSON, T. MARR	M.	London, England.	Nov. 16, 1870.	July 31, 1874
JORDAN, GABRIEL	M.	Mobile, Alabama.	Sept. 18, 1872.	Nov. 10, 1884
JUDAH, THEODORE D.	M.	Buffalo, N. Y.	May 4, 1853.	*
KEEFER, SAMUEL	M.	Brockville, Can.	Jan. 6, 1869.	Jan. 7, 1890
KINGSLEY, WILLIAM C.	F.	Brooklyn, N. Y.	June 6, 1870.	Feb. 21, 1885
KIRKWOOD, JAMES P.	M.	Brooklyn, N. Y.	Nov. 2, 1852.	Apr. 22, 1877
KLOMAN, ANDREW	F.	Pittsburgh, Pa.	Jan. 27, 1875.	Dec. 19, 1880
KNIGHT, WILLIAM B.	M.	{ Kansas City, Mo. }	{ J. Jan. 6, 1875. M. Jan. 7, 1880. }	{ Dec. 7, 1890
KRUPP, FREDERICK	F.	Essen, Prussia.	June 14, 1870.	July 14, 1887
LANE, MOSES	M.	Milwaukee, Wis.	Dec. 4, 1887.	Jan. 25, 1882
LATIMER, CHARLES	M.	Cleveland, O.	Apr. 5, 1876.	Mar. 25, 1888
LAURIE, JAMES	M.	Hartford, Conn.	Nov. 5, 1852.	Mar. 15, 1875
LAWLER, JOHN	F.	Prairie du Chien, Wis.	Apr. 28, 1883.	Feb. 23, 1891
LEERS, FRANK A.	M.	Paterson, N. J.	May 4, 1877.	May 19, 1890
LESAGE, LOUIS	M.	Montreal, Canada.	Sept. 7, 1881.	Jan. 9, 1889
LEWIS, J. W. P.	M.	Philadelphia, Pa.	Jan. 5, 1853.	*
LOCKWOOD, JOHN	A.	New York City.	Apr. 5, 1882.	Nov. 28, 1891
LOWTHORP, FRANCIS C.	F.	Trenton, N. J.	Mar. 17, 1870.	June 1, 1890
LYON, WILLIAM M.	F.	Pittsburgh, Pa.	Mar. 23, 1870.	July 3, 1889
MACY, ARTHUR	M.	New York City. {	J. July 12, 1877. M. Dec. 2, 1885.	{ Apr. 14, 1891
MAHAN, DENNIS H.	H. M.	West Point, N. Y.	Mar. 2, 1853.	Sept. 16, 1871
MALÉZIEUX, EMIL	H. M.	Paris, France.	Nov. 3, 1880.	May 20, 1885
MARSHALL, CHARLES A.	M.	Johnstown, Pa.	Oct. 1, 1884.	May 31, 1889

* Precise date of death unknown.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
MASON, EDDY D.	M. F.	Toledo, Ohio.	{ M. July 10, 1872. F. Dec. 28, 1872. }	Dec. 19, 1874
McALPINE, CHARLES L.	M.	New York City.	Dec. 4, 1867.	Jan. 11, 1884
McALPINE, WILLIAM J.	H. M.	{ New Brigh- ton, N. Y. }	{ M. Feb. 3, 1853. H. M. Oct. 26, 1888. }	{ Feb. 16, 1890
MERCUR, FREDERICK	M.	Wilkes Barre, Pa.	July 20, 1870.	Jan. 10, 1888
MERRILL, WILLIAM E.	M.	Cincinnati, Ohio.	Oct. 6, 1872.	Dec. 14, 1891
MERZ, FREDERICK W.	M.	Louisville, Ky.	May 28, 1872.	Dec. * 1883
MICHAELIS, OTHO E.	M.	Augusta, Me.	May 6, 1874.	May 1, 1890
MILLER, SAMUEL H.	M.	Kensington, O.	Sept. 6, 1882.	Mar. 18, 1891
MITCHELL, ALEXANDER	F.	Milwaukee, Wis.	June 13, 1883.	Apr. 19, 1887
MONROE, J. ALBERT	M.	Providence, R. I.	Sept. 15, 1869.	June 11, 1891
MORLEY, JAMES H.	M.	St. Louis, Mo.	Oct. 6, 1886.	Sept. 11, 1889
MORLEY, WILLIAM R.	M.	Paso del Norte, Mex.	Sept. 6, 1882.	Jan. 12, 1883
MORRELL, WILLIAM H.	M.	New York City.	Nov. 5, 1852.	*
MORRIS, WILLIAM W.	M.	Cincinnati, Ohio.	Jan. 5, 1853.	*
MORSE, JAMES O.	M.	New York City.	Feb. 9, 1853.	Mar. 8, 1883
MORTON, JOHN H.	M.	Denver, Col.	June 3, 1891.	Feb. 8, 1892
NEWTON, ISAAC	M.	New York City.	Mar. 3, 1880.	Sept. 25, 1884
NICKERSON, LOUIS H.	M.	Baltimore, Md.	Sept. 18, 1872.	May 6, 1877
NORTON, FREDERICK O.	F.	New York City.	June 4, 1879.	Sept. 27, 1892
OGDEN, WILLIAM B.	F.	New York City.	Mar. 23, 1870.	Aug. 3, 1877
O'SULLIVAN, THOMAS S.	M.	St. Louis, Mo.	Jan. 5, 1853.	Nov. 1, 1855
PAINÉ, WILLIAM H.	M.	New York City.	May 12, 1875.	Dec. 31, 1890
PHILBRICK, EDWARD S.	M.	Boston, Mass.	Sept. 6, 1874.	Feb. 13, 1889
PHILLIPS, WILLIAM	F.	Pittsburgh, Pa.	Mar. 24, 1870.	Apr. 14, 1874
PHINNEY, HENRY W. B.	M.	West Fall Brook, Cal.	Jan. 7, 1885.	Nov. 22, 1888
POINIER, P. PORTER	J.	Cambridge, Mass.	Mar. 3, 1875.	June 11, 1876
POST, SIMEON S.	M.	Jersey City, N. J.	Nov. 5, 1852.	June 29, 1872
POTTS, RICHARD	M.	Chicago, Ill.	June 1, 1870.	July 11, 1891
PRATT, T. WILLIS	F.	Boston, Mass.	Nov. 4, 1870.	July 17, 1875
PROSSER, THOMAS	M.	New York City.	Dec. 4, 1867.	Sept. 15, 1870
RANDOLPH, JAMES L.	M.	Baltimore, Md.	Mar. 1, 1882.	Sept. 17, 1888
REED, EDWARD M.	M.	New Haven, Conn.	July 10, 1872.	Feb. 13, 1892
REED, SAMUEL B.	M.	Joliet, Ill.	Oct. 20, 1869.	Dec. 26, 1891
REEVES, SAMUEL J.	M.	Philadelphia, Pa.	Apr. 5, 1868.	Dec. 15, 1878
RENO, JAMES H.	M.	Pittsburgh, Pa.	Nov. 5, 1879.	Aug. 5, 1881
ROBERTS, W. MILNOR	M.	Rio de Janeiro, B'z'l.	Sept. 21, 1870.	July 14, 1881
ROBINSON, MONCURE	H.M.	Philadelphia, Pa.	July 6, 1853.	Nov. 10, 1891
ROEBLING, JOHN A.	M.	Trenton, N. J.	Dec. 2, 1868.	July 22, 1869
ROGERS, ALBERT B.	M.	Waterville, Wash.	June 6, 1883.	May 4, 1889
ROGERS, JOHN B.	M.	St. Louis, Mo.	July 2, 1873.	Apr. 1, 1874

* Precise date of death unknown.

Name.	Class.	Residence.	Date of Membership.	Date of Death.
SCHOTT, C. RIDGELY	M.	New York City.	Apr. 1, 1874.	July 9, 1878
SCHUYLER, HOWARD	M.	San Francisco, Cal.	June 7, 1882.	Dec. 3, 1883
SCOTT, WILLIAM L.	F.	Erie, Pa.	July 7, 1870.	Sept. 19, 1891
SCOWDEN, THEODORE R.	M.	Cleveland, Ohio.	May 7, 1873.	Dec. 31, 1881
SEELEY, THOMAS J.	M.	Guaymas, Mexico.	Feb. 1, 1882.	Oct. 2, 1883
SEYMOUR, M. T.	F.	New York City.	July 21, 1870.	May 30, 1885
SHELDON, SIMEON	M.	Cleveland, Ohio.	Feb. 5, 1873.	Mar. 4, 1883
SHINN, WILLIAM P.	M.	Pittsburgh, Pa.	Sept. 15, 1869.	May 5, 1892
SHREVE, SAMUEL H.	M.	New York City.	May 19, 1869.	Nov. 27, 1884
SICKELS, THEOPHILUS E.	M.	New York City.	Feb. 21, 1872.	Feb. 4, 1885
SIDELL, WILLIAM H.	M.	New York City.	Nov. 5, 1852.	July 1, 1873
SITES, WILMON W. C.	M.	Jersey City, N. J.	Nov. 6, 1878.	Oct. 1, 1885
SMITH, CHARLES A.	M.	Newburyport, Mass.	Apr. 7, 1880.	Feb. 2, 1884
SMITH, CHARLES C.	M.	St. Paul, Minn.	July 10, 1872.	Apr. 17, 1889
SMITH, C. SHALER	M.	St. Louis, Mo.	Mar. 5, 1873.	Dec. 19, 1886
SMITH, C. VANDERVOORT	M.	New York City.	July 5, 1876.	June 30, 1884
SPALDING, IRA	M.	New York City.	July 20, 1870.	Oct. 2, 1875
SPIELMANN, ARTHUR	M.	Hoboken, N. J.	{ A. Mar. 5, 1873.	Nov. 25, 1883
			{ M. Sept. 5, 1877.	
STAHLBERG, ALBERT J.	J.	Copenhagen, Denm'k.	Mar. 4, 1874.	Aug. 19, 1887
STEWART, DAVID A.	F.	Pittsburgh, Pa.	Nov. 7, 1872.	Dec. 14, 1888
ST. JOHN, ISAAC M.	M.	Richmond, Va.	July 14, 1871.	Apr. 7, 1880
STRATTON, FRANKLIN A.	M.	Philadelphia, Pa.	May 3, 1876.	July 17, 1879
TALLCOTT, WILLIAM H.	M.	Jersey City, N. J.	Feb. 2, 1853.	Dec. 8, 1868
TASKER, CHARLES A.	J.	Cincinnati, Ohio.	Nov. 4, 1874.	Oct. 4, 1879
TASKER, THOMAS T., Jr.	F.	Philadelphia, Pa.	Jan. 7, 1873.	Aug. 19, 1877
THAW, WILLIAM	F.	Pittsburgh, Pa.	Aug. 30, 1871.	Aug. 17, 1889
THOMPSON, JOHN C.	M.	New York City.	May 18, 1870.	Jan. 17, 1880
TOTTEN, JOSEPH G.	H.M.	Corps Engs. U. S. A.	Mar. 2, 1853.	Apr. 22, 1864
TRACY, EDWARD H.	M.	New York City.	Feb. 19, 1868.	Aug. 28, 1875
TRACY, JOHN F.	F.	New York City.	Jan. 20, 1873.	Feb. 13, 1878
TRAFTON, GILMAN	M.	Louisville, Ky.	Jan. 4, 1871.	May 25, 1887
TYSON, HENRY	M.	Baltimore, Md.	July 10, 1872.	Sept. 1, 1877
VAUGHAN, FREDERIC W.	M.	Louisville, Ky.	Feb. 17, 1869.	Oct. 19, 1887
VINTON, FRANCIS L.	M.	Denver, Col.	Aug. 5, 1868.	Oct. 6, 1879
WALLING, HENRY F.	M.	Boston, Mass.	May 6, 1868.	Apr. 8, 1888
WALTON, LOUIS R.	M.	Earlington, Ky.	Apr. 1, 1885.	Nov. 9, 1885
WARDLAW, JAMES R.	M.	New York City.	Mar. 3, 1886.	Dec. 29, 1891
WEBER, M. M. B. VON	H.M.	Berlin, Germany.	Jan. 2, 1880.	Apr. 18, 1881
WELCH, ASHBEL	M.	Lambertville, N. J.	Aug. 7, 1872.	Sept. 25, 1882
WELD, F. FLOYD	M.	Waterbury, Conn.	Sept. 3, 1884.	June 28, 1889
WELLS, DANIEL L.	F.	Milwaukee, Wis.	June 13, 1883.	Nov. 24, 1884
WHEATON, EDWARD	A.	Boston, Mass.	Mar. 3, 1880.	Mar. 6, 1889

Name.	Class.	Residence.	Date of Membership.	Date of Death.
WHIPPLE, SQUIRE	H.M.	Albany, N. Y.	May 6, 1868.	Mar. 15, 1888
WHITELAW, JOHN	M.	Cleveland, Ohio.	Feb. 5, 1873.	June 16, 1892
WHITMAN, THOMAS J.	M.	St. Louis, Mo.	Jan. 29, 1868.	Nov. 26, 1890
WHITTON, ANDREW D.	M.	Philadelphia, Pa.	May 6, 1891.	Feb. 23, 1892
WIGHTMAN, HENRY M.	M.	Boston, Mass.	Apr. 2, 1873.	Apr. 3, 1885
WIGHTMAN, WILLARD	M.	Ashland, Ore.	Sept. 5, 1888.	Oct. 29, 1889
WILLIAMS, NORMAN A.	M.	Utica, N. Y.	Feb. 17, 1869.	Oct. 12, 1879
WILLIAMS, WILLIAM	F.	Buffalo, N. Y.	June 16, 1870.	Sept. 10, 1876
WILSON, ARTHUR OWEN	M.	Huntsville, Ala.	Mar. 7, 1888.	Dec. 20, 1891
WILSON, WILLIAM W.	M.	Yonkers, N. Y.	Jan. 5, 1870.	Feb. 7, 1887
WOOD, ARTHUR H.	J.	National City, Cal.	Mar. 31, 1891.	April 2, 1892
WORTHINGTON, H. R.	M.	New York City.	Jan. 5, 1876.	Dec. 17, 1880
WRIGHT, GEORGE F.	M.	Santa Barbara, Cal.	Jan. 4, 1888.	Aug. 20, 1892
WRIGHT, J. BUTLER	F.	New York City.	May 24, 1870.	Oct. 31, 1877
WRIGHT, WILLIAM W.	M.	Philadelphia, Pa.	Nov. 4, 1872.	Mar. 9, 1882
YORKE, EDWARD	M.	Sacramento, Cal.	Nov. 1, 1882.	May 28, 1884

GENERAL INFORMATION.

MEETINGS.—Regular meetings are held at the House of the Society at 20 o'clock on the first and third Wednesday of each month, except July and August. The Annual Meeting for the election of officers and hearing the Annual Reports is held on the third Wednesday in January, beginning at 10 o'clock. A Convention is held annually, at a time and place determined each year by the Society.

The House and Library of the Society are open to members and visitors introduced by them, from 9 to 17 o'clock each business day except Saturday, when it is closed at 13 o'clock.

PUBLICATIONS.—The Transactions and Proceedings of the Society are at present issued in twelve numbers each year. They are furnished to all classes of Members and to persons subscribing \$100 or more to the Building Fund of the Society. They will also be sent to any subscriber at the rate of \$10 per year; and to clubs of ten or more, when ordered through the Secretary of an Engineering or Technical Society or Club, who will be responsible for the payment, at 25 per cent. discount. They may be had with cut or uncut edges, as desired.

The "Bulletin" is issued semi-monthly to all members of the Society. It contains all announcements, circulars and notices of meetings of the Society, besides abstracts of papers to be read, or in the course of publication.

PROFESSIONAL PAPERS.—The Board of Direction invites professional papers and communications on subjects of engineering interest from all persons, whether members of the Society or not. These papers and communications will be accepted for publication in the Transactions of the Society, subject to the regular rules prescribed by the Society laws in regard to its publications. These rules provide for a proper editorial supervision, and for the exclusion of old matter readily found elsewhere, of matter specially intended to advocate personal interests, of matter carelessly prepared or controverting established facts, and of matter purely speculative or foreign to the purposes of the Society. All papers become the property of the Society on their acceptance.

Discussion is also invited from all persons interested in the papers presented to the Society, such discussion to be, of course, subject to the same editorial rules.

HOUSE OF THE SOCIETY.—The Society has purchased and now occupies the house No. 127 East 23d street, New York City. The Building Fund has been created to pay for this property.

ADDITIONS TO LIBRARY.—It is very desirable that copies of books on engineering subjects, and of reports of municipal, railway, canal, water supply and all other public works, be added to the Library. Members of the Society and all who feel an interest in the establishment of a library of this character, are asked to secure and send to the Society any such books and reports.

ADMISSION TO MEMBERSHIP.—The members of the Society are, under the Constitution, classified as Members, Associate Members, Associates, Juniors and Fellows. The requisite qualifications for either class will be found in Article II of the Constitution, pages 5 and 6. The provisions as to Honorary Membership are in Article III, page 6.

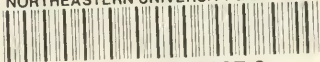
The form of application for membership will be found on page 16. Information as to fees, dues, commutation of dues, certificates of membership and badge, will be found on page 21.

For blank forms and for information, address the Secretary, at the Society House.

REMITTANCE.—All remittances should be made payable to the order of the AMERICAN SOCIETY OF CIVIL ENGINEERS. They should be in drafts on New York, or in postal money orders, payable at the New York Post Office (not at a branch office, or sub-station).



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